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ABSTRACT

A study examined cognitive disorders and syntactical deficiencies in the inmate populations of federal penitentiaries in Canada. The focus of the study was on the relationship between language development and cognitive ability. During the study, a total of 240 inmates from prisons throughout Canada were given hour-long interviews in which they provided oral language samples and completed three cognitive tasks dealing with diagramming relations, following directions, and determining ships' directions. In addition, data were collected pertaining to the inmates' ages, educational attainment, criminal records, intelligence quotients, and past performance on achievement and personality measures. Also interviewed were three control groups of normal adults who were not inmates, normal adults who were inmates, and learning-disabled adults who were not inmates. Because the interviews were administered by two separate examiners and because significant differences in the scores were found by each examiner, the data collected by each examiner had to be analyzed separately. It did appear, however, that those inmates examined may reasonably be said to have learning disabilities. It also appeared that while the inmates differed from one another on the qualitative patterns they provided on the language and cognitive measures, they were, nevertheless, generally inferior on these measures to non-learning disabled adults in and out of prison. (MN)

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Cognitive Disorders and Syntactical Deficiencies in the Inmate Populations of Federal Penitentiaries in Canada

P.R.S. Koopman

The University of British Columbia

Report for the Solicitor General of Canada

March, 1983

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Peggy R. Koopman

CHAPTER I

THEORETICAL BASIS OF THE INVESTIGATION

"The limits of my language are the limits of my world."

(Wittgenstein, 1922, p. 5)

Introductory Statement:

The investigation of relationships among certain aspects of language competence, cognitive adequacy, and criminality is a difficult task for the clinician who is also a researcher. The learning disabled person, we are told, is much like ourselves. That is, he or she would not be distinguished from others immediately by either physical appearance or manner.

We are told that the adult learning disabled are normal individuals with learning problems and that, potentially, they can learn to function at an average to above average level if they receive appropriate educational training. Yet, we as clinicians know that there are some persons who appear to be so handicappped in basic learning functions that their personality development has been affected. Consequently, such an

individual may appear to be neurotic or psychopathic, rather than learning disabled.

We know as clinicians that most learning disabled persons carve out constructive adult lives without treatment, by employing such maneuvers as compensation and circumvention. In doing so, they may make great sacrifices, succeed only through extremely hard work and suffer loss of self esteem. But what of those who do not achieve such progress?

The literature tells us that the learning disabled are more "at risk" than other individuals with respect to alcoholism and substance abuse. They experience greater difficulties than other adults in interpersonal relationships and have a higher divorce rate. Their social deviations may be so severe that both as juveniles and as adults they break the law seriously enough to be sent to prison. In prison, the juvenile learning disabled person, in particular, adopts all too well the characteristics of the available role models and consequently tends to return to prison more frequently than do other young offenders. Further, he has often committed a more serious crime.

This study is concerned with these people - men and women with learning disabilities who do not suffer from basic psychopathology or limited mental ability. They are

people who should be "normal", except that some basic learning processes were not available when they were needed for cognitive development. This developmental deficit interfered with the broad spectrum of their lives to such an extent that we now encounter them in one of the federal prisons in Canada.

One purpose of this study was to investigate the relationship between the faulty learning patterns of these individuals and their functional capabilities. By itself, this information would be valuable; but it is no longer sufficient to satisfy the clinician-researcher. The researcher is concerned with advancement of knowledge in the field, but recognizes that this knowledge must be available for use in an acceptable and effective form to the clinician, who can then establish its validity in practice, with learning disabled adults. Similarly, the clinician must at some point stop the diagnostic process and commit himself to therapeutic objectives and methodological strategies designed to attain these objectives.

The study described in this report is but the first in a planned program of research. The ultimate purpose of the program is the development of an educational plan for learning disabled adults in prison. It is only through the careful grounding of theory in clinical intuition and

empirical research, followed by investigations of the applications of the theory, that we can establish the real worth of the research outcomes and begin the true function of our profession - that of helping people to lead more effective lives through increased personal competence.

Learning Disability and Crime:

In the psychological literature, there is almost no indication of either the presence or the incidence of learning disability among adults. Yet, information abounds that these problems are still present in adolescents. For example, Coons (1981) has stated that no studies were found that dealt with the treatment of the adult offender who was learning disabled. Further, all assumptions about treatment for adults were extrapolated from studies with children as subjects. This extrapolation would be appropriate if one could assume that the developmental order of skills is invariant regardless of the age at which the order is begun. One must also assume that the same treatment strategies are appropriate for all age groups. These assumptions have yet to be investigated.

At the practical level, however, persons involved in the education and treatment of adults both in and out of prison report with great conviction that their clients do

suffer from specific learning disabilities. The staff have indicated that these problems interfere with the lives of their clients in many more spheres than that of educational attainment.

Reports of investigations of the adolescent learning disabled provides possible evidence for a causal link between learning disability and crime. For example, Murray (1976) found that the incidence estimates of learning disability among juvenile delinquents ranged from a low of 22.0% to a high of 90.4%. He postulated that, in addition to lack of self-esteem through repeated school-related failure, there is a second possible precondition which

> "...is briefer and much more direct, at least in taking the chain to the point of increased susceptibility to delinquent behaviour. In effect, this rationale - call it the Susceptibility rationale - argues that certain types and combinations of Learning Disability are accompanied by a variety of socially troublesome personality characteristics..."
>
> -Murray (1976), p. 23)

Murray's subjects shared the characteristics of impulsiveness, poor reception of social cues and poor ability to learn from experience, with other learning disabled juveniles and adults.

The establishment of a causal link has not yet been

demonstrated empirically, but Lysakowski (1980) has reported that

> "inferring incidence from the juvenile delinquent population is justified as there exists an accepted significant relationship among academic failure, juvenile delinquency and adult criminality."
>
> Lysakowski, (1980), p. 5

Additional literature which supports this view includes a study of high school students by Polk, who indicated that "...among the small group of individuals who had both delinquent and academically unsuccessful labels the level of adult criminality was quite high (83%)" (Polk, 1976, p. 38). In addition, Keilitz, Zaremba and Broder (1979) compared a sample of 397 male 12 to 15 yr-old adjudicated juvenile delinquents, with 984 officially non-delinquent boys of comparable age. They found that 32% of the delinquent group and 16% of the non-delinquent group had learning disabilities. Again, these findings do not establish a causal relationship between learning disability and delinquency, but are supportive of the hypothesized relationship between the two variables. Finally, a finding which supports the hypothesized link between juvenile delinquency and adult criminality was reported by Berman (1978) who found that 75% of a groupof incarcerated adults had a history of learning disability.

Coons (1981) summarized the research in juvenile delinquency by stating that the findings do not support the belief that the learning disabled youths commit more crime. However, if they do commit a crime, and appear in the court, they are treated differently. They are less able to appreciate the nature of the court system and, therefore, defend themselves badly. Consequently, they are more likely to be sentenced. The sequence of events that follows sentencing, and the probability of a youth's subsequent recidivism are not discussed in Coon's report. Because they are relevant to this study, they are discussed in later sections.

Coons (1981) also expresses doubt that underlying processes are the determinants of learning disabilities in the adult. "In fact, with adults, attributing inferior academic performance to some basic deficit in cognitive ability is, at the present time, a hazardous act which at best must be highly speculative and has little or nothing to contribute to attempts at remediation." In partial response to Coon's findings, the present study further investigated the applicability of theories of cognitive psychology and, in addition, began to address the question of increasing cognitive competence.

Campbell and Davis (1981), who investigated impulsivity and related cognitive styles in inmate

students, disagree with Coon's conclusions. They have found that many psychometric tests are of little use because of the effects of impulsivity, which, in turn, is found to covary with many variables under investigation. The major research question of one of the studies reported was whether "an inmate student population will exhibit dysfunctional cognitive styles (e.g. impulsivity, field dependence, low conceptual level and low attentional focus) relative to a non-inmate population". Unfortunately, due to the high rate of dropout of inmates in the study, possibly due to the accurate selection of impulsive subjects, their hypothesis could only be tentatively tested, but did appear to be supported by their data.

From the two reports discussed above, it appears that there is some disagreement as to whether learning disability in the adult or the adult offender is, at the present time, worthy of investigation. In addition, the existence of a causal relationship between learning disability and crime is still speculative. If, however, the notion of the "adult learning disabled offender" is valid, then it is important that the structures which might underlie this concept be examined. Cognitive processes and their dynamic relationships with learning disability will be discussed below as hypothetical

constructs which may best account for the available clinical information.

Steven Duguid (1981c) states that attitudes or personality characteristics of criminals may originate in cognitive factors and the associated levels of reasoning ability. He assumes that the inmate makes a "choice" among possible behaviours. In some instances the outcome of the "choice" is crime. If we extrapolate to some extent from the list of behaviours he presents, we may see that these behaviours are very similar to those thought to be characteristic of learning disabled persons. However, for learning disabled persons, these behaviours are assumed not to be under their control, and are, in fact, seen as symptoms of their disorder.

There appears to be a predisposition to offend. The individuals who do so appear frequently to lack reasoning skills, and to show a profound egocentricity almost reminiscent of pre-adolescent stages of cognitive-moral development. They tend to be narcissistic and to lack the qualities of insight and empathy. Right and wrong are seen only in terms of personal needs.

Because they lack analytical skills, to these individuals, the world is episodic. They do not integrate the past with the future, nor are they able to anticipate and/or predict future events. They are unable to learn

from experience. Their behaviours tend to be impulsive and aggressive; the individual acts out, rather than utilizing such strategies as verbal rehearsal and hypothesis testing. In addition, these persons have impoverished fantasy and imagination (Duguid, 1979).

It is proposed that Duguid's list of characteristics, if modified to some extent, are amenable to re-education through the teaching of problem-solving strategy formation. But it is the thesis of this study that direct instruction will be ineffective in many cases, if it occurs without an understanding of the nature of existing process disorders in the affected individual.

If we are to unravel the several constructs mentioned above and describe their probable association with crime we must first examine the basic components and their possible interactions.

Learning Disabilities:

Quay and Parsons' (1971) three categories of educational exceptionality (defect, deficit and process dysfunction) are useful for beginning a discussion of how learning disabilities or, as this study will refer to them, "process disorders", are related to other types of learning problems. When modified to some extent, the

first two categories may be defined as follows: Deficit learning problems are those in which the individual has a lack of appropriate experiences and is missing skills or information, while defect learning problems are those in which the individual has developed faulty learning strategies, and has stored incorrect skills and information. In addition, there is often an emotional component to the latter category.

These two categories do not in any way ascribe difficulty to any constitutional or innate problem within the individual. These individuals are probably the ones whom Duguid sees as simply lacking the knowledge to approach problem solution. He is correct in concluding that these persons would benefit from direct instruction, as there is no dysfunction within the individual which would prevent strategy acquisition.

The third category is that of process dysfunction, i.e., disorder. This is the only category of the three that hypothesizes that the basis for an individual's learning problem is some characteristic of his learning process. Central to this concept is the assumption of aptitude-treatment interaction. That is, the ways in which this person learns must be defined if an effective treatment program is to be developed. This study is concerned only with those in the third category, i.e.,

those individuals who, because of their behavior, may be thought to have process disorders.

McLoughlin and Netick (1983), in distinguishing learning disabilities from disorders caused by environmental factors, suggest that an adequate assessment must include the following:

1. Oral and/or written language. It is necessary to measure significantly below average performance in any one of the major areas of language on an individual assessment of oral or written language.

2. The approach to different types of learning, such as discrimination, memory, rule learning, concept learning, etc. (Gagne, 1970), must be assessed.

3. Task approach skills, such as how learning disabled students handle presentation or response modes, cues or prompts, reinforcement, criteria for mastery, etc. must be tested.

4. Learning strategies. Procedures to address, organize and use information (e.g., note-taking error detection) can be directly assessed (Alley and Deshler, 1979).

5. Neurological disorders. Although the assumption about etiology is not to be taken as a mandate for neurological assessment (Hammill, 1981), neurologists can diagnose the obvious problems.

6. Other commonly mentioned factors, such as diet, allergies, biochemical agents, and heredity must also be investigated (ACLD Newsbriefs, 1982).

This set of intrinsic qualities which should be investigated when learning disability is assessed is similar to the cognitive processing framework assumed in this study.

Bellak (1978) in describing the symptoms of minimal brain dysfunction says, " an outstanding characteristic of the child with MBD is a profound disturbance in the regulation and control of drives and impulses". The persistence of this characteristic into adolescence and adulthood has now been documented by several investigators. Emotional outbursts - including assaultive behaviour, restlessness, and inability to hold jobs - are typical manifestations of MBD in the adult. There is suggestive evidence that many people with alcoholism, drug addiction, and other social problems are minimally brain damaged.

People with MBD have a tendency to act out on a neurotic or psychotic level. They act, instead of verbalizing, because verbalisation was impaired or failed to develop properly in childhood. Many researchers hypothesize a neurological dysfunction as well as a

genetic etiology of learning disability. The behaviours listed by Bellak are very similar to those observed in adult prisoners with learning disabilities. However, etiology will not be examined in this report because it, unlike the cognitive processing approach, has as yet little to offer the educator with regard to treatment.

Cognitive Process Disorders:

Cognitive information processing models consider central cognitive processes and language to be the basis of intellectual development. Information processing models attempt to specify the mental processes that determine specific sets of input-output relationships (Das, Kirby and Jarman, 1975, 1979).

Cognitive psychologists have developed constructs such as verbal mediation, selective attention, temporal processing, and simultaneous and successive processing to describe how humans "think". This is largely because understanding of human behaviour in terms of stimulus-response association has proven to be unsatisfactory. More complex constructs have been developed in response to the need to adequately describe human behaviour, largely because the processes by which a person extracts meaning from sensory information is not subject to direct observation. In addition, behavioural psychologists had

for a long time shown little or no interest in the so-called cognitive processes. Experimental research in this area is, consequently, of relatively recent origin (Neisser, 1967).

The term "process" - more specifically, "psychological process" - in the context of education is usually identified with, and frequently replaces, the term "ability". Both terms are synonymous with what earlier educators called power, potential, factor, capacity, or faculty. Sometimes the two terms are used interchangeably. Thus, a person may have a learning disability which is corrected through process training (Ross, 1976).

Central to this study is the psychological construct, "cognitive process". While there are many possible processes that are related to learning that might be studied, three have been chosen for investigation: selective attention, sequential processing and temporal processing. The three are frequently cited in, or can be inferred from, disability research, particularly from studies of learning disabilities in persons involved in crime.

Selective Attention: the ability to attend to the

relevant features of a stimulus while ignoring the non-essential ones. (Ross, 1976; Hallahan and Kauffman, 1976; Hagen and Kail, 1975). Berlyne (1970) defined the ability similarly, as the capacity to select among impulses and to attend - hence to respond - to one or a limited number of impulses at a time. This is a highly adaptive capacity, and a defect in using this capacity can easily be seen to be a considerable handicap.

Available research begins to suggest that many learning disabled children share a developmental delay in the ability to sustain selective attention. Other characteristics often attributed to learning disabled children, such as hyperactivity, perseveration, distractibility, and impulsivity, can be seen as derivatives of a problem of selective attention (Ross 1976). Selective attention is also implicated in learning disability by reports of significant correlations between measures of attention and performance in learning (Samuels and Edwall, 1981; Schworm, 1979; Hallahan, Tarver, Kauffman and Graybeal, 1978; Arguliwicz, 1981).

In one of their studies, Dykman, Ackerman, Clements, and Peters (1971) assessed 82 boys with learning disabilities whom they compared with 34 academic controls. The learning-disabled children ranged in age from 8 years to 11 years 11 months and were failing in school, despite

at least average intelligence test scores. They used a reaction-time task in which the child had to respond to a signal under a variety of distracting conditions. Compared to the normal controls the learning-disabled children made significantly more errors and had slower reaction times. In a related study which also included an operant conditioning procedure, a time discrimination task and three psychophysiological measures, Dykman's colleagues subjected their data to a factor analysis which revealed that "focus of attention," the primary factor, differentiated between learning-disabled children and controls.

Since the world is full of irrelevant stimuli, an individual would be flooded with useless information if he attended to everything. To be effective and efficient in the processing of information, the mature individual must be able to differentiate between the relevant and the irrelevant and learn to ignore the irrelevant. Many learning disabled adults appear from clinical case studies to have continuing difficulty with selective attention. They do not know what aspect of a stimulus to attend to, and they attend to different aspects of the same stimulus at different times. They are not only unaware of irrelevancies, but unable to determine levels of importance, i.e. what aspect is the most important, next,

etc. They also seem unaware of how many aspects of the stimulus exist and how to find this out. They may stop their scan when they have perceived only one or two variables. Thus each time the stimulus is presented they get a different idea of what the stimulus is in total. This difficulty affects a person at all levels of learning, from "b" and "d" reversals, to deciding what is a lie and what is the truth in a news article.

Several other concepts have been closely associated with selective attention in the literature. Sometimes these are used as though they are synonymous with selective attention, but in other cases they are treated as independent. A brief description and discussion of three such concepts follows, with emphasis on their relationship to selective attention.

A. Arousal - How much attention a person is giving to the stimulus field as a whole is what Berlyne (1970) identified as the intensive aspect of attention. One can differentiate among aspects of arousal, attentiveness and degree of concentration.

There is evidence of a close relationship among concentration, impulsive responding, and arousal in learning disabled hyperactives. It has been demonstrated that improvement occurs simultaneously on vigilance and

impulsivity measures when the children are placed on stimulant medications and also when they are receiving rewards. Since the stimulant drugs and rewards are both known to enhance arousal, these results seem, once again, to implicate the arousal system in attending and inhibiting behaviours.

Arousal deficits have been hypothesized by clinicians to go hand in hand with stimulus seeking behaviours, both of which often result in impulsive and sometimes criminal activities. We also know that high levels of arousal may make subtle differences; attention during such a state is more difficult to perceive and sustain. There is obviously a critical arousal level and a pattern of inextreme variability that leads to the most efficient performance.

B. Impulsivity - Weiss, Hechtman and Perlman (1978) identified impulsivity as the major characteristic of learning disabled hyperactive children which continues into adulthood. These people grow up to be less economically successful, are distractible, emotionally more immature, more dependent and unable to maintain goals. They are also impulsive, rather than reflective, in relationship to cognitive tasks. It has been reported that twenty-five percent of these young adults engage in

delinquent behaviour.

As will be discussed later in this section, studies of impulsivity are fraught with differences and outright disagreements. In the opinion of the investigator, the differences are often due to the use of inappropriate measures of impulsivity. For example, impulsivity is often measured on motor tasks rather than in the contextual milieu, where it is most detrimental. The reasons for not doing so are obvious: separating the effects of impulsivity from other variables in a multivariate situation is most complex. This study will contribute to the solution of this problem by defining impulsivity as a behaviour within the concept of selective attention.

C. Stimulus seeking - Douglas (1976) says that the activity level of hyperactive children sometimes increases when they are subjected to stimulus-reduced environments, providing some support for the hypothesis that hyperactives may have an unusually high need for stimulation and, as a consequence, may also have an unusual inclination to seek heightened levels of stimulation.

If, as Siegman (1961) says, the delinquent perceives that time passes slowly, this may produce a sense of

boredom which in turn may be responsible for the excessive need for stimulation, which may be one of the immediate causes of the delinquent behaviour.

For some time, Douglas (1972, 1974, 1976) has argued that the major disability of hyperactive children involves an inability to sustain attention and to inhibit impulsive responding on tasks or in social situations that require focused attention, reflective, organized and self-directed effort. Unlike Ross (1976), who believes that the hyperactive child's impulsivity and hyperactivity are learned reactions to experiences of failure resulting from a more basic selective attention problem, Douglas (1976) considers impulsivity, hyperactivity, and the inability to sustain and organize attention as closely related aspects of the same constitutionally determined problem.

It may be that the learning disabled individual, in order to maintain a sufficient arousal level, must seek stimulation in a more concerted manner than normal individuals, thus becoming known as stimulus seeking. If he also fails to attend to the appropriate variables, we have some logical precursors for behaviour that may lead to difficulty in meeting societal expectations, and conflicts with the law.

If problems with selective attention persist into adulthood and continue to disrupt the learning potential

of individuals through arousal deficits, with consequent impulsive and stimulus seeking behaviours, and if affected individuals are seen as "more susceptible" to criminal behaviour, we have established the first process that this study will seek to investigate. Many items on McLoughlin's list of intrinsic learning disability factors are easily reconceptualized in terms of selective attentional dysfunction - e.g., discrimination learning, note taking, error detection etc.

Sequential Processing: In the differential diagnosis of learning disability, the sequential nature of the stimulus to be processed has long been included as one component in various measures. Unfortunately, because it is usually not measured specifically, it has often been confounded in studies and in theory with memory or sensory modal variables.

Zinkus and Gottlieb (1979) reported a study of 35 subjects with significant auditory sequential memory deficits, among whom only 7 manifested isolated auditory processing disturbances; 28 subjects exhibited auditory perceptual deficits in combination with visual perceptual or visual-motor problems. This group with multiple perceptual deficits was significantly deficient in

reading, spelling and arithmetic. It is the opinion of this investigator that a strong possibility exists that this study, along with countless other investigations into the modality related aspects of deficit, missed the major stimulus characteristic, sequential processing.

McLoughlin and Nettick, in their list of factors, mention strategies of organization, storage and retrieval, and types of learning such as memory. All involve sequential processing, which may be one of the critical variables across categories.

"...Successive processing involves the formulation of a code which is more temporal in nature being accessible only in a linear way" (Das, Cummins, Kirby, and Jarman, 1979). Simultaneous processing involves the formation of a code which is quasi-spatial in nature, having a major characteristic that all parts of the code are immediately surveyable. The theory of simultaneous and successive synthesis emphasizes the form of cognitive representation used in task performance. The theory describes the processes underlying measures of cognitive abilities (Jarman, 1978). In its conceptualization of temporal processing and relational thinking, this research will separate the sequential aspect from the relational nature of the elements in a series. Since Das et al. did not make this distinction, this is an important innovation.

Das et al. (1979) stated that successive processing was involved in the syntactic organization of expressive speech, while simultaneous processing was found to be significantly related to spatial ability, inductive reasoning and associative memory. They emphasize that the findings reinforce the contention that successive processing cannot be equated with simple rote memory. They predicted that successive processing would relate significantly to a measure of syntactic organization in a story recall task. As predicted, the two indices of syntactic complexity loaded on the successive factor while measures of quantity of story recall loaded on a separate factor. Although story recall obviously involves memory, it seems more appropriate to interpret these findings in terms of short-term memory ability since one would expect memory abilities to be related more to the indices of quantity rather than complexity of speech output.

Children with learning disability as compared with normal controls "gave evidence over and over again that they were severely impaired in temporal order and in the ability to sequence events and objects appropriately" (Owen et al., 1971). We see that this author does distinguish between temporal and sequential processing. Birch and Belmont (1964) studied sequencing difficulties

in learning disabled children. They found that, not only were they less proficient in sequencing than normal controls, but that there was a significant positive correlation with reading achievement.

In contrasting imagery, which he says involves synchronously organized informational structure that contributes to the richness of content, flexibility, speed of thinking, and verbal processes are seen as having a higher degree of sequential constraint which limits memory content and flexibility, but contributes logical direction to thinking (Paivio, 1975). "The verbal system must be viewed as a sequential processing system. Presumably the cognitive processes involved in verbal thinking reflect such organization to a significant degree. That is, multiple units of information are available successively not simultaneously." The relationship between imagery, temporal thinking, and simultaneous processing, as opposed to successive and sequential processing, being discussed here, will be pursued later in this report.

Learning disabled adults report that they have difficulty following directions, memorizing telephone and social insurance numbers and verbal sequences of any kind. Their tendency to scramble word order when speaking tends to support a sequential component to their learning disability pattern. This is similar to Duguid's

observations that inmates tend to impulsiveness, agression and acting out rather than thinking through by verbal rehearsal, and hypothesis testing.

The preceeding discussion has described a relationship between selective attention and learning disability. Impulsivity, a manifestation of a deficit in selective attention, could include acting with aggression as one of its manifestations. Verbal expressive ability and thinking through a problem have been shown to be specifically related to sequential processing and both skills appear to be deficient in the learning disabled.

Hypothesis testing involves not only sequential processing but also relational thinking and conceptual organization of information. For this we need the third cognitive process, that of temporal processing.

Temporal Processing: Temporal processing will be defined in this study as the individual's ability to see relationships between and among events in a sequence. This ability may involve simple ordinal function, development of syntactic structures in language, organization of logical thought structures of simultaneously presented stimuli in problem solution, or personality characteristics such as insight and empathy.

The relational thinking involved may exist on a scale ranging from simple literal understanding of stated material to complex abstract thought.

Duguid acknowledges that his clients do not perform these functions well. This study will show that a specific subset of these poor problem solvers are incapable of learning through direct instruction because they have some combination of all three process disorders. It appears that these processes may exist simultaneously in learning disabled persons. In fact, they often appear to be related. Whether selective attention problems render a person less able sequentially, and whether the inability to sequence information places restriction on relational thinking is not yet known, but the two constructs seem to be logically related and will be discussed as such. However, any attempt to establish empirically a causal chain of events must await further research.

Thinking clearly involves taking in or encoding stimulus information, organizing and storing it in memory, and retrieving the information according to the requirements of a given task. "...By synchronous organization, I refer to the integration of complex information into a unitized compound..." (Paivio, 1975). A major functional characteristic of such a process is

that components of the cognitive complex are simultaneously available for retrieval, although retrieval itself may proceed serially because of the limitation of other systems that operate on the imagistic information. (Paivio, 1975)

Simultaneous processing and synchronous organization appear to this writer to be highly related to one another and to the cognitive ability of temporal processing. Das et al. (1979) says that both simultaneous and successive processing are important features of cognition and that they are distinct from traditional mental abilities. They report that simultaneous processing may be important for the development of advanced levels of comprehension skills.

These psychologists do not believe that simultaneous and successive processing processes are hierarchial, or dependent for development one upon the other. This researcher questions the latter statement within the context of the dynamic relationship between these processes and problem-solution learning. Certainly both processes must be present for learning to take place. Perhaps the problem is that successive processing is both sequential and temporal, and that simultaneous processing is not a sufficiently broad construct to include as an essential variable relational, ordered aspects of thought.

It is difficult, and probably not only impracticable, but also incorrect to separate temporal processing from the contextual framework; within the framework such processing either is intact and functional or is faulty and inhibitory to the development of cognitive strategies. A study on future time perspective and impulse control in young offenders that probably comes closest to looking at temporal processing as it relates to criminal offence is reported by Siegman (1971).

Siegman hypothesized that the range of one's future time perspective is a significant source of variance in the experience of duration. The longer the range of one's future time perspective, the faster one's internal clock. Barndt and Johnson (1955) found that delinquents have significantly shorter future time perspectives than comparable non-delinquents. Siegman coupled these two ideas and included a second objective, that of investigating the relationship between impulse control and future time perspective. The latter has been shown by many to be related both to delinquency and to learning disability.

His findings support the hypothesis that the delinquent group had significantly lower future time perspective scores as well as lower time estimation

scores. Greenacre (1945) suggests that delinquents live primarily in the present, and that their lack of concern for the future is one of the factors responsible for their criminal behaviours.

With respect to the present investigation several points emerge. Future time perspective involves the ability to apply temporal processing skills to organize, predict and control unpredictable events. We would suspect that individuals with short future time perspectives would have difficulty with tasks such as those presented by Siegman, because of faulty temporal processing ability and perhaps also because of faulty sequencing ability. If time is seen as passing more slowly by these people than by non-delinquents, causing boredom, and if, as we have hypothesized earlier, these individuals have a greater need for stimulation and suffer from concomitant arousal deficit (both stemming from a selective attention process disorder), then multiple relationships become apparent at a logical deductive level.

Siegman's lack of a positive correlation for impulse control and future time perspective is also important. The author says that perhaps there is a third variable which is associated with delinquency that encompasses both of these. This investigator believes that this variable

probably is selective attention: the reasons for this belief have already been explained.

Glenwick, Croft, Baroca and Black (1979) did not find a positive correlation with regard to delinquents and impulse control either. They utilized the Kagan Matching Figures Test and found that the delinquents were in fact more reflective than the non-delinquents on both the latency and error dimensions of the MFT. They hypothesized that institutional effects had modified the delinquents behaviour so that they evidenced lack of risk taking. This investigator believes that it is just as likely that impulsivity again was not being measured as a manifestation of selective attention and was confounded with other variables, thus creating "no effect" for impulsivity.

The cognitive processes of selective attention, sequential and temporal processing are the underlying structures to which this investigator looked when analyzing the language and cognitive data of this study.

Language:

The child develops language to code thought. According to Piaget, language develops concurrently with cognition and defects in the development of either will affect both. The development of language follows an

orderly invariant pattern. While individuals develop language at different rates and to varying degrees there is no evidence for variation in the sequence of the emergence of language structures.

Researchers such as Bloom (1970) contend that a child must have perceptual-conceptual knowledge of surrounding events before being able to symbolize those events linguistically. There is also an implication that perceptual-conceptual knowledge is used by the child to learn language.

Language learning appears to involve two perceptual-conceptual processes: 1) Identification and abstraction of recurring events 2) Integration of the particular language form with the specific aspect of the event being represented. The first process involves abstracting relevant from irrelevant aspects of experience and has been shown to be related to language usage of both words and syntactical constructions (Clark, 1973a; Bloom, 1970). Language acquisition, or the development of language by the child may require him to manipulate his sensory-perceptual field and develop verbal expression to bring sense and order to it.

But what happens if this child does not have within his perceptual armament the ability to attend selectively in order to choose between relevant and irrelevant aspects

of an experience? What happens if the child can only process two or three bits of information at a time? Selective attentional problems could result in difficulty in attaching correct labels to experiences, and faulty development in articulation and rules of grammar. We know that learning disabled children are delayed in morphological development (Wiig & Semel, 1974). We also know from the literature that learning disabled children stay at the two-word stage longer than do other children and, initially, their sentences are shorter in both written and spoken language.

If the child is unable to selectively attend, and can only process a few pieces of information sequentially, the effects on the development of increasingly complex linguistic expression seem obvious. As syntactical structures become more complex they require the speaker to process an ever more detailed temporal interrelationship among events. The child must understand that "John loves Mary" does not mean the same thing as "Mary loves John". He must be able to extract precise meaning from language that involves embedded clauses, double negatives etc, and these must first be within his own repertoire.

If the child is unable to develop syntactic competence, then he will not use, nor will he understand complex sentence structures that are fully developed in

most 6 year old children. Not possessing these structures, he will have limited comprehension in discussion and reading. If he cannot acquire knowledge through reading and discourse, then his conceptual world will not expand and he may remain at a simple or compound sentence level - that of concrete and literal interpretation. Learning disabled children are said to use short sentences of simple linguistic structure. Because of these limitations they may be unable to understand the more abstract and complex demands of their environment.

It appears to this writer that it is feasible to hypothesize that the child initially develops language to organize his world and to express himself descriptively or in terms of personal needs: eventually, however, if language cannot progress to complex structures because of perceptual dysfunction, cognitive development will be inhibited. Thus, while language initially codes thought, faulty language caused by perceptual dysfunction may inhibit cognitive growth and, in fact, eventually determine thought.

In studying the language of aphasic children, Ingram (1970) noted that aphasia in children is not simply a syntactic impairment, but a cognitive deficiency in those features of cognition that are prerequisites for language

learning. There seems support in this statement for the view that cognitive processes affect syntactical development. However, it is beyond the scope of this investigation to determine to what extent and in what manner language determines cognition, or cognition determines language. The relationship between language development and cognitive competence in inmates with characteristics of learning disability is the focus of this research. The pursuit of this relationship does not demand a causal link at this time.

Any description of language requires information regarding three major language units a) semantics - the meaningful aspect of language, vocabulary, etc. b) phonology - speech production including articulation and c) syntax - the structural aspects of language including grammar, morphology, and sentence development.

Language has only recently been a focus of interest in learning disabilities. This delay in acknowledgement probably occurred because learning disabled people often exhibit a "facade" of language competence. As young children, they probably compensated for lack of other specific abilities and became "talkers". They are verbally very fluent if we concentrate on the number of words they say and their speed of production. Their vocabulary is rich and varied in self-initiated expression

such as story telling or relating events. They are fascinated by words and will use "big" words more often than other children. For instance, they may be the first children to memorize all the dinosaur names.

There is a rule of language that says that the lower the language feature the more difficult it is to access. For learning disabled children, it seems also more difficult to develop. Semantics is the most meaningful aspect of language and has ready access for the learning disabled person. This is why they have good vocabularies. Moreover, they can handle the concrete usage of words. However, if we tape and transcribe their speech we do not observe the same competence in other major units of language. Phonologically, they make more articulation errors than other children and they do not correct these errors as readily when exposed to correct speech models.

Delayed syntactical development has been found to be the language feature most likely to be affected by learning disability. Abilities which play the most important role in development of comprehension of syntactic structures are the following: to process increasing amounts of parallel temporal-acoustic linguistic information and situational information, to form hypotheses about structures represented in this information, and to hold information in short-term memory

so that it can be decomposed by retrieval of structures from long-term memory. (Menyuk, 1976) The effects of attentional, sequential and temporal processing are apparent.

There exists great difficulty in measuring syntactic competence in children. This is even more true for adults. There are no adult norms developed for most of the measures employed by language specialists. Few linguists address the adequacy of adult language, especially syntactical competence. David Crystal's analysis was used in this study as it was developed for use with adults as well as children and it does look at syntax specifically using a natural language sample. However, as Crystal says, "...Current psycholinguistic theory has no coherent explanation of syntactic complexity, and any attempts to assert that some structures are 'more basic' or 'more complex' than others on intuitive grounds, soon create difficulty, if anything other than the most elementary of sentence-building skills are being investigated."

Because syntax is deficient in the learning disabled, and because the clinical observations of this researcher have been that this same situation exists for adults, especially adults in prison, both language analyses and their outcomes will be described within the limits of our

measurements and the theoretical boundaries.

Language and Learning Disability:

In adults, lack of language competency may give the impression of a general lack of mental ability. For this reason many therapists cease to be concerned with the deficient learning performance of these people and learning disability is not suspected. Researchers such as Wiig and Semel (1974, 1975, 1976), scholars who are particularly skilled in analyses of language development and defect, have continued their studies into adolesence and adulthood. They appear to believe, as this investigator does, that if the language of an individual is affected to such an extent that he does not have sufficient structure to support expression and understanding at an adult level, then all learning for this individual will be affected. Because language is involved in almost everything we learn as adults, its importance must not be overlooked.

This section will review research studies of learning disabled persons and their faulty language development.

Language deficiency: Marge (1972) estimates that 50% of the learning disabled have language deficiencies. Wiig and Roach (1975) suggest that learning-disabled

adolescents depend heavily upon semantic aspects for language processing, experience immediate memory and sequencing problems for modifier-strings, and exhibit a prevalence of interfering perseverative responses. The earlier discussion regarding the semantic competence of learning disabled children versus their lower syntactic competence is relevant in this context.

Evidence that receptive and expressive language deficits are more prevalent in children with learning disabilities has been reported by various researchers (McGrady and Olson, 1970; Meir, 1971; Rosenthal 1970; Wiig, Semel and Crouse, 1973; Wiig and Semel 1972, 1973, 1974).

Syntactic Deficiencies: Semel and Wiig (1975) in their study of syntactic structures and verbal elements in learning disabled children concluded that the deficits were interpreted to reflect delays in syntactic rule learning, reduced simultaneous analysis and synthesis and reduced auditory memory. Also Wiig and Semel (1975) suggested that productive language deficits in learning disabilities are related to 1) delays in specific aspects of cognition and convergent and divergent production of semantic units and 2) reductions of verbal labels and syntactic structures. Vogel (1974) found that dyslexic

children were significantly deficient in oral syntax as compared to normal children.

Morphological delay: Semel and Wiig (1975) indicated that children with learning disabilities exhibit quantitative reductions in the use of morphology and in the comprehension of linguistic concepts requiring logical operations and in simultaneous analysis and synthesis. This gives support for the presence of the effects of all three process functions in language deficiency in learning disabled children.

It was concluded by Wiig, Semel and Crouse (1973) that high-risk and learning disabled children exhibited differential and qualitatively similar delays in the acquisition of morphological rules as compared to normal children. Groups differed in their use of the third person singular, possessives, and adjectival inflextions, all constructions requiring more complex manipulations.

Sequential processing: Learning disabled children experience difficulties in grammatical comprehension of sentences as a reflection of delayed cognitive and logical growth and reduced simultaneous analysis and synthesis (Semel & Wiig, 1975).

Sequence length and sentence type were determiners for success in sentence repetition tasks for language-

disordered children compared with normal children in a study by Menyuk, and Looney (1972). Imperative and active-declarative sentences were repeated accurately by disordered children but negative and question sentences were not. This suggests that complexity of structure was involved in the failure as well as length of utterance.

Wiig and Roach (1975) also observed that learning-disabled adolescents repeated significantly fewer sentences verbatim than achieving age peers. Their dependence on semantic aspects of language processing, and their experience of immediate memory and sequencing problems for modifier-strings lends support for the syntactic versus semantic disparity experienced by the learning disabled.

Temporal Processing: It should be stated that temporal processing is likely to be one of the key variables in the development of syntax. However, some studies have addressed the logical relational aspects of language development independently and this information is presented separately for clarity.

In an early study Wiig and Semel (1974) observed that learning disabled children exhibited significant deficits in comprehension for logico-grammatical sentences expressing comparative, familial, passive, spatial and

temporal relationships.

Wiig and Semel (1975) in a study of productive language abilities in learning disabled adolescents indicate that these persons produced more agrammatical sentences and grammatical sentences of shorter length than academically achieving peers.

That learning disabled individuals have language deficiencies, and that these deficiencies appear to be primarily those of syntactical development is well established in the literature. The existence of syntactical deficits in learning disabled adults is not well known except through clinical observation. This study will analyze the language of inmates with particular behavioural characteristics reminiscent of learning disability to determine if a syntactic deficiency persists in the adult speaker. Further, if they are found, what kind of deficiencies are they?

Cognition, Learning Disability and Crime:

The fundamental principle of the comparative-development approach to cognition is that, wherever development occurs, it proceeds from a relatively global and undifferentiated state to one of increasing differentiation, articulation, and integration; on the other hand, where development is undone, there is a return

to a greater autonomy of local functions and structures. These correlative principles have the status of heuristic laws; though not themselves subject to empirical test, they are valuable in the formulation of empirically testable generalizations (Toulmin, 1953). Cognitive development proceeds for learning disabled persons in the same manner as it does for other individuals. However, the learning disabled tend to have difficulties in differentiation and integration, making concept formation very difficult to accomplish.

A concept is defined on the basis of some perceptual similarity in environmental objects and events (Brown, 1958; Bruner, 1966). The primary perceptual process involved in the acquisition of concepts is abstraction or identification of perceptual similarities from irrelevant aspects of events (Klausmeier, Ghatala and Freyer, 1974; Clark 1973a). Subjects who have difficulties in differentiation will have difficulties in spotting irrelevancies. This, in the learning disabled, is likely because of selective attention deficit. Clark (1973a), in an extensive literature review on concept formation, found that much experimental data suggested that sorting relevant from irrelevant attributes influenced concept learning.

Recalling Duguid's list of criminal cognitive behaviours related to problem solution deficit, the following list is presented as a similar set of behaviours copied from the files of inmates in one federal prison who had been selected and interviewed for this study:

1. low integration
2. high ergic tension
3. doesn't understand what people say
4. would like to know why he committed offenses
5. attention focusing difficulties
6. inappropriate self and social concepts
7. fails to attend to consequences of actions
8. relies on others to re-establish his stability
9. follows his own urges
10. practically minded person, more concerned with things as they appear at the moment
11. places great emphasis on structure
12. poor impulse control
13. egocentricity

The two lists are, in addition, not dissimilar to that compiled by McLoughlin.

Cellini (1979), in a rebuttal article on cognitive failure and social deviation, discussed the cognitive handicap of learning disabled children: "The inability of

some learning disabled children to view reality as a "normal" quantified reality (i.e. mathematical notation) may be the manifestation of a child's particular learning disability or minimal brain dysfunction. Such a view of the world is characterized by a non-linear and repetitive view of time. Underwood supports such an explanation:

> "Characteristically learning disabled children are immersed in concrete thinking: they do not comprehend subtle forms of communication: they do not make inferences: they do not comprehend the nature of the relatedness of one human being to another. Just as they do not incidentally pick up academics and therefore must be taught specifically, so they must be taught the fundamentals of interpersonal relations. Moreover, LD children perhaps because of their faulty time concepts, seem unable to project themselves into the future. It could be that this is what is behind their very common trait of being unable to defer gratification, a characteristic they share with the criminal population."
>
> - Underwood (1976)

Underwood's article brings together, like few others presently in the literature, the cognitive, academic and personality development of learning disabled people. Their difficulties with relational thinking, and the consequences in personality traits is illustrated clearly.

The congruence among the the several sets of

behaviours having to do with learning disability (McLoughlin), criminal cognitive behaviours (Duguid) and annecdotal data (federal prison file) is impressive. The common thread that runs through all the lists appears to be cognitive processing disorders of a very primary nature.

Concluding Statement:

Rather than performing the traditional task of summarizing all the literature to this point in the report. The investigator will describe one study (King, 1975) which stands out as an exemplar. Research such as this probably does more to encourage exploratory investigations (such as the present study) than any other type of literature.

King (1975) investigated "the ego and the integration of violence in homicidal youth." As the number of homicidal crimes had increased in his state, King's interest lay in the exploration of these youths' characteristics and what made them kill. His only selection criterion for inclusion in the study was the act of homicide, the assumption being that the act served the same purpose for all the youths, irrespective of their personalities, ages, sex, ethnic groups, intellectual capacities or the circumstances of their backgrounds. His

sample consisted of nine youths. The homicidal act was committed at an average age of 14.

His research methodology is very interesting because it combines that of a multiple case study and an ecological approach. He observed the total environment of each individual, recorded and then looked for similarities among them that could partially explain their acts.

His findings will be grouped according to their relevance to this study. The categories obviously overlap as we would expect they should, but the important contribution to the present study is that, in these youths, inability in language and reasoning coincide with educational attainment, social interaction and, in this instance, serious crime.

Educational Deprivation:

i. The youths were unable to function educationally and were given a poor prognosis without treatment. An educational program in language competence was the treatment program of choice.

Language Deficit:

i. They were "stunted" in language skills.

ii. Forms of communicating which imply delay (such a talking) tended to be experienced as

stressful and less tolerable than violence.

iii. Action was their language of communication.

iv. They were impulsive or action-oriented not governed by language and education.

v. Their terseness in speech and action warded off talk and the cognitive challenge of reason.

Lack of Logical Reasoning:

i. They were explosively intolerant of learning the logical steps to the solution of a problem.

ii. To these youths, the rituals of reasoning were unbearable.

iii. In the perspective of cognitive deficit, poor judgement was prominent in their homicides.

Personality Consequences:

i. They reported no guilt, remorse or conscious awareness. They had an absence of psychosis, but were confused in personality orientation and had disturbed psychosexual development.

ii. Violence was an integrating force.

iii. Their short attention spans were more than symptoms of maladjustment.

iv. They controlled interpersonal interactions through centering everything around their own behavior.

King's work is important in that he integrates observation and theory. It also points to areas of needed research. This study has attempted to begin the search for some answers to the questions raised in his study. For example, we too want to know what part language plays in logical reasoning ability. Are these persons almost psychopathic in functional emotional capacity because of an inability to learn appropriate personality traits? Is impulsivity carried to its extreme such that these persons represent, as King says, a state of "I feel!, I act!, I am!".

King's study deals with extremes. But extremes are important when we look for justification. If an ungoverned feeling state, where action determines personality, is the outcome of the lack of cognitive-moral development; and if language is somehow implicated in this lack of development, then no further justification should be needed to emphasize the importance of measuring language function in incarcerated adults.

CHAPTER II

RATIONALE OF THE INVESTIGATION

Methodological Considerations:

Clinical evidence based only on impression and informal experience, no matter how extensive, must be tested empirically. It is only in this way that we may establish that a phenomenon exists and is not an artifact of a particular person's relationships with his/her clients. Others performing the same technique or administering the same measures must be able to replicate the initial results.

But even when we investigate systematically through disciplined inquiry, we risk losing effects observed clinically. Some of the ways in which this may occur are:

1. Data gathered on children cannot automatically be generalized to adults. The field of learning disabilities often utilizes data from very young children as independent variables in studying older children and even adults. However, these same constructs may take different forms at other levels of the developmental

hierarchy. The measures that are constructed to assess the extent of the phenomenon must necessarily reflect the developmental characteristics specific to each age group. These methodological facts are often ignored in research on learning disabilities.

2. Similarly, data gathered from adults of a) one socioeconomic background, b) one racial group, c) one subculture, and/or d) one ability or academic level cannot be generalized to other sub-populations. The presence of any other constitutional variable may contribute as much or more to the magnitude of the effect as the construct being tested. Thus, research where these constitutional variables are present must provide for their effects in the research design. Again, research in learning disabilities often investgates a specific phenonmenon with a narrowmindedness that does not recognize the effects of other potent variables.

3. Logical reasoning does not take the place of statistical tests of significance. Cases in which a finding appears to be "logical" or in which there does not appear to be any other plausible explanation do not satisfy the requirements of research. Many things that appear to be related or seem to have a cause and effect relationship are not replicated by empirical investigation. Learning disability research is often a

confounded mixture of known and surmised information. As such, systematic research is rendered much more difficult.

4. Evidence collected in one study and evidence collected in another may uncover two important pieces of information. This information now exists scientifically, but because it was derived independently and in isolation we cannot assume that it will be observed again when measured simultaneously. Research in learning disability often suffers from effects found in laboratory research "misbehaving" in the complex real environment. The solution is to utilize more sophisticated multivariate statistical designs.

5. Multiple studies with small n's cannot be reasonably grouped for analysis as this renders the error variance as large or larger than the effects sought. This usually results in non-significance of results. One reason that so much of the literature on the learning disabled does not support the logical contentions of the clinician is that the sample sizes are often too small and statistical measures that are relatively insensitive to small effect magnitudes must be applied. When researchers become aware of this problem, they often attempt to group subjects from many small studies that measured the same variables. However, in these cases, the sources of error become overwhelmingly large. Consequently, any treatment

effect is swamped by the effects of the constitutional variables mentioned above, and no statistical significance is obtained.

6. Interactions among classes of variables are often neglected. Studies that investigate academic achievement that is to be altered within an environmental milieu without conscious provision for cognitive and personality variables often measure them unwittingly, thereby yielding uninterpretable results. Conceptually, the field of learning disability is just now recognizing the importance of the potential effects of cognitive and personality variables on academic achievement. Much of the early research is confounded in this manner. The academic problems are secondary to those of process, language, cognition, and personality. Thus the level of measurement of the last-named variables should be at the primary not the secondary level.

7. Definitional problems abound in research. Researchers use different definitions to investigate the same phenomenon, thereby de facto measuring different things. This is one reason why the results of studies in learning disabilities yield conflicting results. One study supports the relationship while the next does not find it at all. Definitional problems are more than semantic - they are based most frequently in theoretical

assumptions that are not immediately obvious from the statement of the problem.

8. Subject sampling is difficult in all research. Measures employed to aid subject selection are often not designed for that purpose. They are not factor pure and measure a variety of factors simultaneously. Thus only part of the measure is performing the activity desired by the researcher. Learning disability research has traditionally used measures designed for other reasons that have some relationship to learning disability. When used for purposes of subject identification they are often guilty of creating false positive identification among other error types. The learning disabled are heterogeneous as a group. If we add members from other groups erroneously then our chances of learning anything about the learning disabled is considerably reduced.

9. When the incidence of a phenomenon is not known and may in fact be infrequently occuring in the population a validity study is in order. Random selection from the general population may not catch enough appropriate subjects in its net. The lack of significance in results will give the impression that the phenomenon does not exist in reality. Much of the research on juvenile delinquency and learning disability has not been able to demonstrate a relationship between delinquency and

cetain disabilities because of sampling problems.

10. Subject self-selection often occurs in studies of learning disability. Scarcity of subjects available and high dropout rates in training research cause the remaining subjects to be of a particular sort which may not be representative of the group as a whole. What we find then is not generalizable to the population of most interest to us.

11. Academic learning problems are of great concern to individuals working with the learning disabled. Research to investigate these problems often chooses the schoolroom as its sole sample pool. Even though learning disability is a school-related problem we often do not find potential clients in a school program. This is particularly true of the adolescent and adult learner where long, painful and unsuccessful experience with education may make the school the least likely place to find the clients most appropriate for the study. Very little research in learning disability takes place outside the schoolroom.

Characteristics of the Present Research:

This study was an investigation of the validity of clinical judgement. Specifically, it investigated the interrelationships of several concepts. The clinical

judgements were based on observations of different groups of learning disabled adults, inmates of provincial and federal prisons, forensic psychology referrals, individuals with primary emotional disturbance, and juvenile delinquents.

Learning disabled individuals have particular sets of language, cognitive and personality characteristics. These characteristics have been observed clinically and been investigated in bits and pieces empirically.

In order to avoid the research problems just described, this research study has incorporated the following features:

1. Data collection procedures enter at the level of syntactical language competence, using a developmental measuring device. This was prefered to measures of secondary effects in academic achievement, which uses tools not developed for the purpose or for the age group.

2. Statistical analyses assessed the effects of constitutional variables such as sex, IQ, years in school and age, in order to render the results interpretable and not confounded.

3. This study tested the logical clinical judgements of the Director by means of systematic investigation and traditional statistical analyses using a multivariate design. This enables the Director to look for

interrelationships among several dependent variables simultaneously.

4. This study sampled from inmates in nine prisons in four regions of Canada. Thus, the effects are not regional and should be generalizable.

5. Several classes of variables are considered simultaneously in this study. Language, cognition, ability and achievement, and personality are measured.

6. Traditional measures of learning disability were not employed as they were considered:

a) to measure academic achievement only and in a very general way

b) factorially too complex for the specificity of measurement desired

c) to have been developed for reasons other than selection and screening.

This study chose to use initial screening criteria, followed by developmental language assessment techniques and three cognitive tasks with relatively pure factorial structures. In this way, it was hoped to avoid false positive identification as the phenomenon and its incidence was not yet demonstrated in the literature of the field. Measures were presented in a static and a dynamic form in order to control for effects of prior

experience with testing and the achievement level of subjects at entry. These two methods are discussed in the report.

7. The subject "call" technique consisting of a face-to-face request to the inmate for assistance coupled with a one-time short interview was adopted in this study. This assured an extremely high participation rate and prohibited self-selection without biasing of results.

8. This study sampled inmates throughout the work places in each prison from the school to the laundry, unemployed and skilled vocational workplaces as well as segregation and solitary confinement. This was important to ensure that the turned-off and unsuccessful learner had as equal an opportunity to be selected for participation in the study as those who had volunteered for the school program. These persons were believed to be at least as likely to exhibit the patterns sought as those actively involved in education.

Research Hypotheses:

1. There is a significant relationship between characteristics of language and cognitive competency. That is, those inmates who are not competent in language (as measured by the stage seven scores in the Crystal

analysis) have significantly lower scores on the measures of cognitive ability. Conversely, persons who are competent in language (i.e., who have a larger proportion of responses at Stage 7) will have significantly higher scores on the cognitive tasks.

2. The relationship between language and cognition is independent of constitutional variables such as age, sex, IQ, race, years in school, and academic achievement.

3. The factors underlying the manifest measures of cognition will reflect the cognitive processes of selective attention, relational thinking (temporal processing) and sequencing. The factors are related to measures of syntactic complexity in a similar manner to the manifest measures. That is, subjects who achieve low factor scores are less competent syntactically and conversely, syntactically competent subjects achieve high factor scores.

In addition to testing the research hypotheses, this report will introduce comparisons through the use of exemplars as control data. This will take two forms:

a) Profile analyses of the language and cognitive measures for clusters of subjects

b) Specific case discussions of several types of learners.

The preceeding sections have been constructed to

explain the general approach to the research design. The field of learning disability, especially when the clients are adults, is fraught with problems of conceptualization and methodology. It was the intent of this research to identify the most potent sources of error and to build safeguards into the research design which would avoid them. The main sources and safeguards were outlined above.

It is of course impossible to achieve perfect control in a field study. Nevertheless, stringent attempts must be made, within the limitations of our present knowledge in the field. The results of studies which do not control for these "errors" may well inhibit the process of conceptualization in the area of learning disabilities and may well contribute to the reports of widely varying results. In turn, the variable results may lead both researchers and practitioners to the conclusion that there is simply nothing to find. Clinical information continues to be generated in the absence of findings from systematic investigation. This study not only investigates the validity of some of these clinical impressions, but reflects a belief that there is indeed a fundamental problem, which if investigated, may lead to the development of successful treatment programs.

CHAPTER III

METHOD

Sampling of Prisons within Region.

Prisons were selected within four of the five geographical regions of Canada. Only medium and maximum-security institutions were included as these house the inmates with longer-term sentences. These inmates were believed more likely to exhibit the characteristics sought in this study as they represented a group of individuals for whom a pattern of criminal behaviour was more clearly established than for those incarcerated in minimal security institutions. Further, it was thought that the behavioural and personality characteristics sought as signposts to language deficient origins would be established and stable enough to identify and measure.

The region of Quebec was not included in the study because, for language reasons, the additional cost to the project would have been prohibitive. Similar results would be predicted for a Quebec study should one be carried out. A follow-up study should include Quebec as a further check on the validity of the phenomenon found in

this study.

The Regional Directors of Education (Pacific, Prairie, Ontario, Atlantic) were consulted by Mr. J. W. Cosman, Senior Advisor, Ministry of the Solicitor General of Canada, and the Project Director to help choose the institutions to be visited by the project staff from among the medium and maximum security institutions in their region.

Pre-Administration Procedures:

The Regional Directors of Education were initially briefed by by Mr. Cosman verbally and by a letter introducing the study and the Project Director which included a copy of the research proposal. The Project Director then contacted each Regional Director by telephone approximately one month before she was to begin data collection in that region. The Regional Director then contacted the Assistant Wardens of Education and Training and of Socialization to inform them of the project and to indicate beginning dates for data collection. The Regional Directors usually sent the Assistant Wardens the copy of Mr. Cosman's letter and a copy of the research proposal. The Project Director was then free to contact the person designated by the Regional

Director in each prison about one and one half weeks before data collection to make arrangements to visit him or her at the prison

The purpose of this initial meeting was to explain the project in detail and to determine who among the prison staff members were seen as most knowledgeable about the inmates as individuals. The list of persons usually included the Assistant Warden of Education and Training, who functions as Principal of the penitentiary school, the Supervisors of Education, vocational and academic teachers, the Supervisor of inmate employment, the Assistant Warden Socialization, living unit officers, and psychologists. Occasionally the Head of Security or a person from the staff thought to be particularly knowledgeable about the inmates was suggested.

This method of choosing informants proved to be very successful, rather than the alternative of deciding a priori that only the Assistant Warden of Education and possibly a psychologist would be the sole informants for each prison. The membership of the informant group did differ somewhat for each prison, but the accuracy of identification of appropriate inmates did not vary. Knowledgeable persons were available in all prisons and job classification was not the best means of finding them. They were known and easily identified by other prison

staff.

These persons were then requested to attend a meeting with the Project Director and the individual who was now the person who was officially in charge of the project in this prison. Occasionally (but rarely) at the end of the first meeting, an Assistant Warden might decide that he/she was not the most appropriate person to shepherd the project through the next few days of data collection, and another person would be selected and contacted to determine if he or she was willing to take on the task. Cooperation in all cases was extraordinarily good. There were instances where the Project Director met individually with the staff members identified and explained the nature of the study, what we were looking for and why, and what benefits to prison education would hopefully occur for some of their more difficult inmates as a result of the findings of the study. The behavioral characteristics were then discussed and from this person's experience with inmates within the prison a list of possible inmate subjects was prepared.

Inmate samples.

Usually, a group meeting was called by the Assistant Warden. At this meeting of interested and knowledgeable

staff, the Project Director described the aims of the project and discussed in detail just what this would involve for the staff of the prison. Time involvement and space requirements were discussed and agreed upon. Next, a description of whom we wanted to see from the inmate population and how we intended to find them was presented.

The mode of presentation included, first, a description of what a person might be like or might do in the prison that would make him or her a candidate for the project. An attempt was made to make the person "live" through vividness of portrayal. The Director wanted the participants to be able to visualize the kind of inmate that was wanted and then put local faces from their population to the model provided. Finally a list of the characteristics was given to the members of the committee.

The list was given last because it was believed important for the members to have a good gestalt of the kind of person wanted first. Then the specific behaviour patterns of these inmates would be more meaningful. The alternative was to work from the list. The process would then become identification by quantity of symptoms, a technique often used in psychology, but one which risks losing the "essence" of the individual behavior constellation. These persons of interest to the study exhibit patterns of behavior and do not simply emit a

series of symptoms. The list of characteristics included:

- Difficulty following directions
- Literal thinking (lack of abstract ability)
- Difficulty assessing relative importance of life events
- Poor cause and effect relationships
- Confusion, bewilderment (especially during verbal discussion)
- Impulsivity (stimulus bound)
- Propensity to say irrelevant or inappropriate things
- Lack of insight into behaviour of self and others
- Inconsistency of performance
- Prediction of consequences often impaired

Each member of the committee was asked to study the table of characteristics for the purpose of developing a list of at least 15 inmates who they believed fit the critieria. The staff member who called the meeting was asked to collect the lists from the members when they were completed. The Project Director and assistant took the lists and developed a list of names that appeared three or more times across committee member lists. There were always a sufficient number of names on the final list.

The Project Director then checked the names for further eligibility by eliminating any inmate known to have organic brain syndrome, mental retardation, or severe emotional disorders such as schizophrenia. A final list was then developed from which the subjects would be called. The desired number of subjects for each prison was 30. This was approximated closely in all prisons

except two within Ontario region, where the combined total was close to thirty inmates.

After the inmate list was developed from among those inmates nominated three times, a call sheet was created. The inmates were identified as to work place, and all inmates from a single work place were interviewed before the examiners moved to another work place. This was to ensure that information about the individual tasks did not have time to filter throughout the entire prison rendering the last inmates testwise. Inmate subjects were found throughout the prison, not only in the school as one might suspect. In fact, less than one third of all the subjects in the study came from the school group. Many of the subjects were in the semiskilled or unemployed work designations.

Inmates were then called to be interviewed without any explanation other than that someone from the University of British Columbia wanted to see them. When they arrived in the area where testing was to take place one of the two examiners took them to a room and explained the study to them and solicited their help. Each subject was promised information about his own performance on the tests given. (This inforation was given during the last minutes of the interview.) Only 7 inmates refused to participate, usually because of job priorities. A further

two subjects did not complete the testing session. In both cases, they said that they were too nervous to concentrate due to worries that were preoccupying them at the time. Table 1 lists the numbers of inmates interviewed in each region.

Table 1: Numbers of Subjects by Region

Region	Number of Subjects
Pacific	33
Prairie	60
Ontario	83
Atlantic	64

It was decided not to utilize random sampling procedures in this research for two reasons. First, no pretence was made of obtaining an estimate of the frequency with which any particular patterns might be found in the inmate population as a whole. As was discussed above, the incidence of these disabilities might be rather low; consequently, strictly random sampling might result in only a very limited number of appropriate subjects, with consequent masking by the larger [illegible] of "normal" individuals. Further, an attempt was made in this study to test the content validity of the list of inmate attributes felt to characterize appropriate subjects, which was drawn largely from clinical and other informal experience. The sample was drawn on a systematic

basis as described above, and no inferences about incidence may be made.

Instruments and Administration Procedures:

Two sets of measures were utilized in the study: the language measures which were administered first, followed by the cognitive measures.

Instruments:

Language Sample. An oral language sample was obtained by presenting the subjects with two pictures. The subject was asked to tell a story about each picture, giving it a beginning, a middle, and an end. This presentation format is similar to that used in the Thematic Apperception Test where one wishes to elicit coherent and connected verbal responses. The subjects were encouraged to offer more and more information until approximately 100 utterances were produced for each of the pictures. This number was necessary in order to complete a reliable syntactical analysis.

The pictures were chosen and mounted by the two examiners. They were chosen because they appeared to be suggestive enough to encourage verbal expression. The Project Director pretested all of the pictures on adult learning disabled clients in her office at The University

of British Columbia.

Cognitive Tasks. The cognitive tasks will be presented in two sections: a) abstract/concrete and b) factorially pure measures, task-analyzed to measure desired cognitive processes.

a) Concrete/Abstract Tasks.

1) The Fable. A short fable was read to the subject. He was told that when the story was finished he would be asked to repeat as much of the story as he could remember. He did not have to remember the story word by word, but he should try to remember all the important details. He was also told that when he had told the story he was going to be asked to tell the examiner what the story meant - what it really was about.

The aim of this measure was to determine if the inmate could remember the sequence of the story events. We were also interested in knowing how many, and which, of the elements in the sequence were missing or incorrect. The interpretation of the story was an important measure, as it gave some indication of the literalness of the subject's understanding of the story. The story was selected from the Mental Examiners Handbook (Wells, and Rueach, 1969, p. 114). All responses were recorded. The story was read slowly and with expression, but was not

read more than once.

2) Proverbs. Three proverbs were read to the inmates one at a time, following the King's Story. After each one the inmate was asked to tell the examiner what the statement really meant. Again, the responses were recorded. If a subject seemed confused or didn't seem to process all of the proverb in one reading, it was read again until he "had it all."

Again, what was desired from this measure was evidence of how the subject interpreted this kind of information. Did he only understand the statement, as it was, or could he give a more abstract and correct interpretation? The proverbs were chosen to be meaningful to the lives of the inmates so that they could identify with the content. The proverbs were:

1. "Lie down with the dogs, get up with the fleas."

2. "The mouse that has but one hole is soon caught."

3. "The tongue is the enemy of the neck."

The first two proverbs lend themselves readily to a literal interpretation. The last proverb could only be interpreted if the speaker went beyond the exact meaning of the words in the sentence.

3) Picture. In addition to being analyzed as an oral

language sample, the response to the picture was scored as a concrete/ abstract task. The only measure derived from this response was an estimate of the level of interpretation.

b) Cognitive process measures. Three task-specific cognitive measures were administered last to the subject. Two were selected from the Educational Testing Service Kit of Factor-Referenced Cognitive Tests (Ekstrom, French and Harman, 1976), while the third was a published test.

The purpose of the collection of 72 factor-referenced cognitive tests for 23 factors is for use by researchers, rather than for use in counselling. They are used in factor-analytic studies where measures with known aptitude factors are important. Such was the case in this study. The two measures were selected because, in addition to their known factor structure, task analyses indicated that they should measure the cognitive processes that were believed by the Project Director to be the underlying basis for many learning disabilities especially those affecting language development. The two tests were: Following Directions and Diagramming Relations.

a) Following Directions. Ekstrom et al. state that the factor involved in following directions is "the

ability to keep in mind simultaneously or to combine several conditions, premises, or rules in order to produce a correct response" They label this factor "Integrative Processess". They further state that "the tests for this factor frequently require the subject to follow a fairly complex set of directions or to handle a set of complex rules. Since the rules or directions are readily available for reference, loadings on memory are minimized." This factor has been described as "integration" in several studies (Guilford and Lacey, 1944; Lucas and French, 1953; Traub, 1970). There are similar factors requiring the "non-intellectual following of directions", or internalizing rules in order to solve problems.

From the task analytic view this test was included because of its great dependence upon the subjects' sequencing ability. Sequencing is very frequently cited as being deficient in many learning disabled children and adults, and is mentioned by language specialists such as Wiig and Semel (1975) as the basis for faulty processing of receptive language functioning and a likely cause of poor syntactical development.

The form of the task is that the subject was asked to answer a series of questions by using a grid that appeared at the top of the page. The questions became more

difficult by a) becoming longer and including a larger number of sequential directions; b) requiring the subject to reverse part of the pattern, a task that was predicted to be very difficult for these subjects as directional variables are commonly a source of high error frequency; and c) posing questions where the inmate had to reorganize the sequence, reversing only part of it.

b) Diagramming Relations. The authors of the manual state that the factor measured by this test is "the ability to reason from premise to conclusion, or to evaluate the correctness of a conclusion." They expand their description of the measures by indicating, "This factor was originally called "Deduction" by Thurstone. In the 1963 ed n of this Kit, it was called "Syllogistic Reasoning." Guilford (1947) and Cattell (1971) have sometimes called this factor "Logical Evaluation." Guildford has pointed out that what is called for in syllogistic reasoning tasks is not deduction but the ability to evaluate the correctness of the answers presented. This factor can be confounded with verbal reasoning when the level of reading comprehension requir ed is not minimized.

The complexity of this factor has been pointed out by Carroll (1974) who describes it as involving both retrieval of meaning and performance of serial operations

on the materials retrieved. He feels that individual differences on this factor can be related not only to the content and temporal aspects of these operations, but al so to the attention which the subject gives to details of the stimulus materials.

This task was included in this study because of its relational (i.e., temporal) requirements. The fact that the subject needed to perform this act on both verbal material (words) and symbolic material made it doubly relevant for the study. The Director was interested in observing whether the subjects could see the relationship of two minor variables to a larger unit, and whether they could then represent this relationship in symbolic form. She predicted that some subjects would be unable to identify the main category and then describe the relationship of the two minor categories to it. In addition, she felt that some subjects who could do this part of the task would be unable to deal with the diagrams as relational events in and of themselves. Finally, there would be a number of subjects who could do both of the forgoing steps but could not relate meaningful linguistic material to the diagrammatic format.

Thus, while following directions largely measured sequencing, this task would strongly measure temporal relationships. Temporal processing is an essential

precursor to syntactical development and is often faulty in children and adults who have learning disabilities.

c) Ship's Destination. This test is a standardized measure (Christensen and Guilford, 1955). The measure was standardized as a military measure designed to select recruits with good aptitude in mathematics. The reason for its inclusion in this study is that it requires the subject to perform a task by manipulating an increasingly large number of variables. He may order these variables in several ways, but they must all be systematically processed in order for a correct answer to be produced.

The task format is an interesting one because the subject must imagine that he is on a ship heading for a destination designated by a grid. His task is to determine just how many miles that destination will be from the port where he is presently. His task is made more difficult because in order to perform it, he has to take into account several factors such as wind, current, and heading. This task was last in the interview, because it was seen as likely to be motivating and thus continue to elicit the maximum performance possible for each subject.

This test should give an estimate of the person's skill in attention to details, and their systematic organization. Cognitive psychology usually refers to

these behaviours as ability in selective attention, i.e. the ability to attend to the critical stimulus variables. The test was read to nonreading subjects.

Administration Procedure:

The entire interview took one hour. It was conducted by either the Project Director or the one research assistant who collected data with the Director in all prisons. Assignment of subject to interviewer was by sequential assignment.

After the subject was seated and the study explained to him, he was asked to sign a release form that would allow the research team to gather pertinent data from his general file. Only one subject felt that he did not wish to participate in that aspect of the study. In three institutions additional consent forms were also signed, indicating that the inmate agreed to participate in the study and understood the nature of his involvement. The usage of the tape recorder, for purposes of speed and accuracy was then explained. Only one subject asked that we record his responses by hand.

The language measures were always presented first. The pictures were shown individually to the subject with the appropriate directions and his responses were recorded. Following this the story was read to him by the

examiner, and he retold and interpreted the story. This was also recorded. The proverbs were presented without pause after completion of the story. The entire language sequence usually took about 15 minutes to complete. It was presented first as it facilitated interaction between the examiner and the subject and was not frustrating due to errors as the cognitive tasks might later become.

The subject was then told that the tasks to follow were to be of a paper and pencil variety. He was told that some of the tasks would be more difficult than others, that different people would find different tasks easy or difficult, and that this was important because we were interested in the different ways in which adults solved problems like these.

The first task presented was Diagramming Relations. The first five items were taught by the Project Director, as examples to the subjects, then the subjects were told to complete the measure on their own. They were to write the letter of the correct response next to the number of the item and to underline the word that represented the large circle. The other experimenter corrected each item throughout the test before presenting the next item. This task took approximately 15 minutes to administer. Subjects who were unable to read a word were told the correct pronunciation.

Following Directions was presented next. The task was explained to the subject and the first item was completed as a demonstration. The Project Director then told the subjects to complete the remainder of the task alone, by circling the correct answer beneath the question. She then allowed the subjects 7 minutes to do as many of the items as he could. If the subject needed help reading the items they were read to him as many times as he needed them. The other examiner taught the first item and then allowed the subject almost unlimited time to finish the task. She also read the material to subjects needing assistance. No subject stayed with the task for more than 12 minutes before declaring that he had gone as far as he could.

The third and final test was Ship Destination. The test was explained to the subject rather than have the subject read the rather complex directions. Both examiners followed the same procedure for explanation of the task. Following this, three examples were completed by the subjects where only one variable was needed. Then six additional examples were provided, using one additional variable. If the subjects could understand the task and completed the examples successfully with few initial errors, they were told to go on to the next page

and begin the task on their own. From that point the subjects were given 15 minutes to see how many of the remaining items they could complete.

The testing aspect of the interview was then terminated. Performance on the cognitive measures was then discussed with the inmate. A very general description of their strengths in sequential processing and relational thinking was provided. They often asked questions about the measures or related the results to some aspect of their work or life. Most subjects reported that they enjoyed the experience. Some inmates volunteered to do more if we needed their help.

Scoring Procedures:

Language Measures:

a) Picture- The tapes were transcribed and reliability checks were made by the Project Director on approximately every 20th transcription. The major procedure used to score the language sample was that of Crystal, Fletcher and Garman (1976). The study was interested in the syntactical level reached by the inmates through recording the percentage of responses at each of the 7 stages of syntactical development. Also recorded was the word and phrase and clause level of competence

demonstrated, and the level of interpretation from - ' I don't know', to predictive statements about the subject matter.

b) Story-Level of interpretation, added details and sequence were the major items coded.

c) Proverbs - Literal vs abstract interpretations were coded for this item.

A list of the measures derived from each of these tasks is provided in Appendix B.

Cognitive Tasks:

Diagramming Relationships. In addition to number correct, and number attempted, linguistic correctness versus diagrammatic correctness was scored through identification of the large circle. Also scored was item type with regard to the inclusive vs exclusive nature of the diagrams, number of guesses, etc.

Following Directions. This task was scored for total score, number attempted, and part scores of 3 items each.

Ships Destination. This task was scored similarly to Following Directions in that total score and number attempted were augmented by part scores on 4 subgroup scores of items throughout the test.

Inmate File Data: Information was gathered from the

inmate files. This information was found in several places in most institutions-a general file, the education file, and the psychology file in most cases. Information sought was:

1. Age in years
2. Sentence in days
3. Grade completed
4. Crime, violent or nonviolent
5. Person or property crime
6. IQ measures
7. Achievement measures
8. Personality measures.

Analysis of the Data:

The analysis of the data was carried out in multiple stages. First, the entire sample was examined for differences in a subset of "key" or "marker" variables which, it was felt, represented the entire data set without induction of linear dependence or excessive risk of alpha error. The effects due to institution, sex and test administrator were tested in the following way. A multivariate analysis of variance, followed by univariate analyses of variance if the multivariate F-value was statistically significant, was performed with each of the three variables as an independent variable and the

"marker" set as dependent variables. The purpose of this analysis was to test for differences within the inmate sample which might bias further results.

Second, the variables in each of the three areas of interest (i.e., cognitive, linguistic and inmate file) were examined and descriptive statistics were computed. Following this step, the exploratory multivariate analyses began. These analyses were carried out for each examiner separately.

Because the literature surveyed, supplemented by clinical intuition , indicated that the cognitive domain was better understood, an attempt was made to extract latent (underlying) variables from the manifest data of the cognitive tasks. This set of tasks, as described above, included responses to the two E.T.S. tests, the Ship's Destination task and the scored responses to the fable and proverbs. The variables were subjected to a series of exploratory factor analyses. This procedure, which aims to reveal hypothetical dimensions which underlie a set of manifest variables, is a commonly-used one. Because no tests of statistical significance have as yet been delevoped to judge such aspects as the adequacy with which a given set of data has been factored, the procedure is open to a greater degree of subjectivity than are procedures such as analysis of variance.

Nevertheless, the results of factor analyses have often been useful for theory development in situations such as the present one, where the aim of research is the investigation of the construct validity of clinical intuition.

Following the extraction of a satisfactory factor structure, factor scores were calculated using the regression method of calculation. These scores were then clustered, using the composite least-squares difference algorithm, and the resulting clusters and their error functions examined. It should be noted that decisions, in exploratory analyses, of how many groups to form as a result of cluster analyses is not well-understood, and presently relies on a priori decisions about the desired numbers of groups, plus subjective examination of the changes in error function.

The cluster analysis program to which the set of factor scores derived from examiner one's data were subjected is based on a method of grouping subjects on the basis of profile similarity. Initially, the set of four scores for each subject was examined, and a composite measure which reflected the set of scores was calculated. The two subjects whose scores were most similar were grouped into a single "cluster", and the program then re-calculated the measure of similarity, treating the set of

two scores as though it were a single subject. The two most similar were again "clustered", and the procedure began again. The clustering continued until all subjects had been included in a single group.

Just as was explained above under the description of the factor analytic procedures which were followed, the cluster analysis procedures do not yield estimates of the adequacy with which a given set of data is clustered, nor are measures of statistical significance calculated. Rather, when deciding on the optimum number of clusters which will be selected from any given data set, an a priori decision is made about the maximum number of clusters which will be selected. Within that range of groups, the composite error function, which is calculated and printed at each clustering step, is examined and the increase in size of the function calculated. The number of groups selected as optimum, within the range of interest, is determined by the magnitude of the increase.

It was decided that six or fewer groups would, in this case, allow for the examination of differences in profiles without making the results difficult to understand, and would in addition reflect the tentative nature of the investigation. That is, it was felt that the examination of more than six groups, and the interpretation of the results, would carry with it the

assumption of greater precision in the measures collected than was warranted by the state of the theory within this area, and the precision of the measures themselves. Consequently, only the cumulative error function for six groups and fewer was examined.

It had been decided that six or fewer groups would be most comprehensible, and would not imply non-existent precision in the cognitive measures. That is, selection of many groups and examination of the small differences among them would imply that the measures differentiating those groups were precise enough to imply that small difference were "real". In the present exploratory study, this could not be said to be the case. Examination of the error function revealed that three groups would be appropriate for both examiners.

In order to check the validity of the factor-score cluster analyses, multivariate and univariate analyses of variance were calculated, using the "marker" variables. Relationships were then sought between the cognitive variables and the linguistic in the following way. The groups of subjects which resulted from the clustering procedure described above were retained and the grouping was treated as an independent variable in a search for significant differences on the measures reflecting the use of language and the inmate file information. Because of

the large number of measures which were derived from this sample, and the consequent risk of attaining a number of spuriously significant differences, the examination was carried out in two stages.

The first step was to examine the proportion of utterances at each of the seven stages of the Crystal procedure. If there were statistically significant differences attained for any of these seven proportions, the second stage of analysis was performed for that stage only. The second analysis consisted of the calculation of multivariate and univariate analyses of variance for the set of sub-scores within the stage whose proportion was significant. Following the investigation of the relationship between the cognitive factors and the measures derived from the language sample, exploratory examination of the data was performed to seek out hints and clues about the relationships between cognitive, linguistic and inmate file information, as well as to explore the hypotheses that the obtained relationships among the higher stage of natural language and cognitive variables were due to such extraneous variables as measured intelligence, general type of crime (i.e., violent versus non-violent), measured personality type, etc.

Finally, small groups, and a series of single

subjects who were representative of several control groups were selected and described subjectively. In the original plan, it was specified that the results of the "clinical" samples would be compared with each of several control groups. However, as the study progressed, it was realized that the purposes of this exploratory study would be better served by a comparison of control groups and single cases rather than one of groups alone, because of the emphasis of the research on the validation of clinical intuition.

CHAPTER IV

RESULTS

The "Marker" Variables:

Before any attempt was made to interrogate the data, a representative subset of the entire collection of measures was selected as a "marker subset", to be used in the various multivariate analyses. It was necessary to choose the "markers" because of the high degree of linear dependance within the data set as a whole. The linear dependance was caused by the large number of measures which had been derived from each cognitive task, and from the language sample. The set of marker variables was selected from the set of data as a whole, and comprised:

Diagramming Relations:	total score number attempted level of comprehension
Following Directions:	total score number attempted
Ship's Destination:	total score number attempted
Analysis of Picture:	level of interpretation
Analysis of Fable:	level of interpretation
Analysis of Proverb:	level of interpretation

Analysis of Discourse:
- number of words
- mean sentence length
- percentage of utterances at stage one
- percentage of utterances at stage four
- percentage of utterances at stage seven

The analyses were carried out in two stages: preliminary interrogations of the data, and final interrogations. Because the preliminary analyses were not directly germane to the research questions stated above, the results of these analyses are only briefly reported in this chapter. The detailed results of the preliminary analyses are reported in Appendix A.

Preliminary Interrogations of the Data:

The univariate analyses had two major purposes. First, they were meant to reveal the general nature of the data when the variables were considered separately. Secondly, the systematic relationships between the set of "marker" variables and each of prison, sex of inmate and examiner were investigated, in order to conclude about the homogeneity of the set of data as a whole. The general results of these analyses were:

1. Results were not different across sex or race of

inmate. Nor did the sample as a whole differ from the general prison population in the proportion of Native Indians (Figure 1).

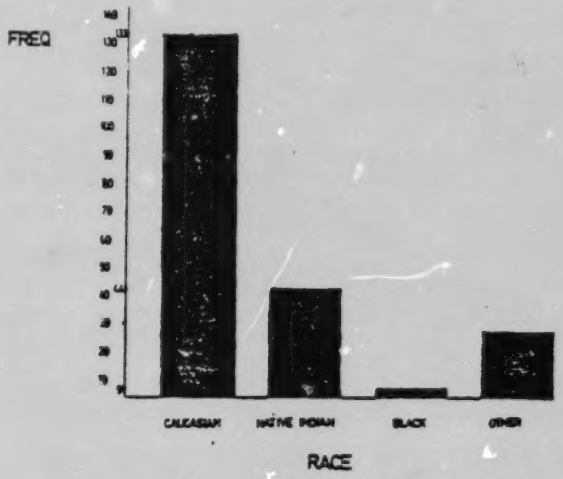

Figure 1: Distribution of Subjects by Race

2. Results were significantly different across prisons. This finding was interpreted as reflecting objectively the different subjective qualities of the various institutions, and as justifying the expense of testing inmates across prisons.

3. Results were significantly different across examiners, as was to be expected given the systematic differences in administration of tasks described in Chapter III. Because of this significant finding, further univariate examinations of the data were computed and

reported for each examiner separately.

4. The overall results of the univariate examinations of the data revealed that, regardless of which examiner administered the tasks, the sample of inmates were functioning at a level of cognitive competence and syntactic complexity which was lower than would be expected in the average adult. As a summary of these results, the mean scores on each of the "marker" variables are given in Table 2.

Multivariate Interrogations of the Data:

Factor Analysis of the Cognitive Tasks:

Because of the statistically significant difference between the two examiners, the factor analyses (and, indeed, any subsequent multivariate examinations of the data) are reported for the two sub-samples separately. As will be discussed at length below, the markedly different results of the factor analyses did not result in differing clusters of subjects being ultimately formed. In the case of the second examiner, who was generally less "standardized" in her administration procedure, the clusters of subjects were not as different from each other as were those of the first examiner.

Table 2: Mean Values for Two Examiners on "Marker" Variables

Variable	Examiner 1	Examiner 2	p
Following Directions:			
total score	3.83	4.13	n.s.
no. attempted	7.72	8.60	0.005
Ship's Destination:			
total score	13.51	15.53	n.s.
no. attempted	21.98	27.69	0.002
Diagramming Relations:			
total score	2.63	3.85	<0.001
no. attempted	7.05	9.89	<0.001
comprehension level	2.06	2.74	<0.001
Picture:			
level of interpretation	2.62	3.28	<0.001
Fable:			
level of interpretation	2.20	2.49	n.s.
Proverbs:			
level of interpretation-1	2.33	2.31	n.s.
level of interpretation-2	2.44	2.44	n.s.
Language Sample:			
No. of Words	225.3	292.2	0.003
Mean Sentence Length	7.14	8.86	<0.001
Percentage of Utterance			
at Stage 1	14.07	11.03	0.020
at Stage 4	15.89	11.22	<0.001
at Stage 7	15.53	22.08	0.001

Examiner One: It was concluded from the initial extraction of factors that that rotation of four factors would provide an adequate solution. First, 62.4% of the variance was accounted for by the four factors; this percentage is only slightly lower than the frequently-used criterion of 70% of variance accounted for. Second, the

Scree test (a subjective examination of differences across the set of eigenvalues) revealed that the difference in slope between four and five factors was the appropriate break-point. The final commonly-used criterion, the presence of eigenvalues greater than one, did not indicate that four factors were adequate. Rather, there were five eigenvalues greater than one in the principal components solution. However, because the other two indicators suggested that four factors would be adequate, the four-factor solution was rotated and examined. It was intended that, should the four-factor solution prove unclear, that five factors would next be rotated.

For each of the two extraction procedures selected (principal components and image), several rotation methods were chosen, and the results of each rotation examined. Because the results of the various rotation were very similar, the principal components solution with varimax rotation was selected for presentation because it is the most commonly-used.

When the criterion of a "salient" loading of |0.35| or greater was used to interpret the results, the factor pattern was generally clear. First, only two of the 16 variables were strongly related to more than a single factor. Second, of the 64 possible measures of relationship between factor and variable (16 variables on

each of four factors), slightly over two-thirds (44) were either very close to zero or high enough to be considered as important (or salient). Third, all variables loaded on at least one factor. Finally, the solution as whole was clearly interpretable.

The four factors, and the variables which relate to each ("load on each") are listed in Table 3. Only those variables which loaded saliently are listed under that factor name. The two variables which loaded on more than one factor are indicated by an asterisk. The loading for each variable is shown in parentheses before the variable name. The task with which each factor is most closely identified is shown in parentheses under each factor name.

The factor solution is a demonstration, first, of the construct validity of the task analyses which selected the measures. Because many of the variables which were subjected to analysis reflected both difficulty level and cognitive skill, the factor solution could have reflected difficulty level rather than task type, if the task analysis had not been successful. Further, for two tasks (Following Directions, and Diagramming Relations), the results are replications of those reported by Ekstrom et al. (1976).

It may be concluded from these results that each cognitive task taps a distinct cognitive skill, and

Table 3: Factors by Salient Variables
(Examiner One; n=102)

Factor I: Temporal Processing
(Diagramming Relations)

(0.96)	prorated total score (DR)
(0.59)	score on items of type A
(0.44)	score on items of type B
(0.54)	score on items of type C
(0.49)	*score on items of type D
(0.59)	score on items of type E
(0.67)	level of comprehension

Factor II: Selective Attention
(Ship's Destination)

(0.64)	prorated total score (SD)
(0.88)	score on items 22 to 33
(0.63)	score on items 34 to 45
(0.39)	*score on items of type D
(0.44)	level of interpretation of fable

Factor III: Sequential Processing
(Following Directions)

(0.58)	*prorated total score (FD)
(0.59)	score on items 5 to 7
(0.64)	score on items 8 to 10

Factor IV: Cognitive Complexity
(Proverbs)

(0.38)	*prorated total score (FD)
(0.40)	level of interpretation (#1)
(0.39)	level of interpretation (#2)

further, that each is a reflection of one of the processes discussed in Chapter I. Each dimension is briefly discussed below, and at greater length in Chapter IV.

Factor I: Temporal Processing. The major characteristics of this factor are the ability to identify

causes and effects, and to see relationships among events. The subject must be able to understand, select and organize information in a connected manner. Diagramming Relations is a measure required such skills (i.e., developing linguistic and symbolic relationships among a set of three objects which are related only by context). This factor may be represented in real life by such variables as syntactic complexity.

Factor II: Selective Attention. This factor is characterized solely by the ability to attend to critical stimulus features. The subject must be able to select the most important details, while ignoring irrelevant information. He/she must also determine the relevant characteristics of any specific stimulus and, further, must be able to manipulate a variety of bits of information simultaneously where no sequence may be apparent. He/she must, therefore, develop and apply some systematic procedure. Ship Destination taps these skills by requiring the subject to select from an increasing number of variables simultaneously. In real life, it may be that subjects who lack this ability are unable to decipher a question, and are consequently unable to respond in anything but a partial or tangential fashion.

Factor III: Sequential Processing. This factor

reflects skill in processing information that is presented serially. Thus, the subject must be able to create, organize and reverse a sequence (or part of one) of linguistic or symbolic information. Following Directions illustrates this ability in that it requires the subject to process increasingly large numbers of bits of information. It may be that subjects who lack this skill have difficulty understanding or following verbal directions.

Factor IV: Cognitive Complexity. In the Piagetian sense, this factor reflects the linguistic equivalent of concrete versus abstract symbolic understanding and expression. The subject must be able to "go beyond" the literal meaning of language, to that which is implied but not stated by the speaker. The level of interpetation of the proverbs and the total score on the Following Directions task require the subject to understand the abstract meaning of the measure. Subjects who lack this skill may, for example, be unable to predict their own responses to events which would normally be thought to be unpleasant.

Following the successful extraction and interpretation of the factors underlying the set of cognitive variables, factor scores were calculated for

each of the four factors, using the regression method, and transformed to z-scores (with a mean of 0.0 and a standard deviation of 1.0). These scores were then subjected to cluster analysis.

Examiner Two: From the initial extraction of factors, using the principal components procedure, two signs indicated that rotation of six factors was indicated. First, 70.5% of the variance was accounted for by six factors. Secondly, the Scree test indicated that six factors were the appropriate number of rotate. The third criterion, the number of eigenvalues greater than 1.0, indicated that only four factors should be rotated. Because of the clarity of the four-factor solution obtained from the data of Examiner One, and because of the presence of only four eigenvalues greater than one, it was decided to rotate four, five and six factors and examine each solution for interpretability, before selecting one for presentation.

Once again, for each of the two extraction procedures (principal components and image), for each of the three numbers of factors (four, five and six), several rotation procedures were chosen and the results of each examined. The results were very similar within each of the four-,

five- and six-factor solutions; therefore, principal components with varimax rotation was selected, and the factor patterns for each of the three solutions examined for interpretability.

The six-factor solution, although neither completely satisfactory nor as clear as Examiner One's four-factor solution, was most interpretable of the three. Of the 16 variables entered into the analysis, six were saliently related to more than one factor (i.e. were factorially "complex"). Of the 96 loadings (six each for 16 variables), 62 (about two-thirds) were either close to zero or salient (i.e., above |0.35|). All but two variables loaded saliently on at least one factor.

The six factors and the variables which loaded on each are listed in Table 4. From the table, it is evident that three of the six factors are only slightly different, and are doubletons - factors which load saliently with two variables only. This situation is unsatisfactory, as is the fact that the degree of complexity (measures loading on more than one factor) is relatively high. Lastly, as is discussed below, the interpetation of the solution is not entirely clear.

For these reasons, and given the clarity of Examiner One's factor structure, it may be noted in passing that the five- and four- factor solutions only increased the

Table 4: Factors by Salient Variables
(Examiner Two, n=118)

Factor I: Selection of Critical Variables
(Ship's Destination and
Proverbs)

(0.73)	prorated total score (SD)
(0.79)	*score on items 22 to 33
(0.70)	*score on items 34 to 45
(0.41)	level of interpretation #1

Factor II: Cognitive Competence
(Ship's Destination
and Following Directions)

(0.36)	*score on items 22 to 33 (SD)
(0.41)	*score on items 34 to 45 (SD)
(0.38)	*prorated total score (DR)
(0.39)	*score on items of type E (DR)
(0.65)	prorated total score (FD)
(0.55)	score on items 5 to 7 (FD)
(0.45)	score on items 8 to 10 (FD)

Factor III: Temporal Processing I
(Diagramming Relations)

(0.56)	*prorated total score (DR)
(0.93)	score on items of type A
(0.49)	*score on items of type E
(0.54)	level of comprehension (DR)

Factor IV: Temporal Processing II
(Diagramming Relations)

(0.41)	*prorated total score (DR)
(0.93)	score on items of type D

Factor V: Temporal Processing III
(Diagramming Relations)

(0.41)	*prorated total score (DR)
(0.95)	score on items of type B

Factor VI: Temporal Processing IV
(Diagramming Relations)

(0.42)	*prorated total score (DR)
(0.91)	score on items of type C

obscurity of the interpretation. For example, it might have been expected that, on rotation of fewer than six factors, two or more of the "Diagramming Relations" factors would merge. This did not occur. In the five-factor solution, Factor IV moved not only to Factor V, but also the Factor IV measure "score on items of type D" loaded saliently on Factor I. This, and other changes in the factor pattern made the interpretation of the five-factor solution even more difficult that that of the six-factor solution.The four-factor solution was even more obscure.

From the factor pattern presented in Table 4, it seems that the most plausible interpretation may be that of an interaction of the task characteristics and the administration procedures, when the subjects are, by and large, learning disabled. Factor I (on which measures of Ship's Destination and one measure derived from the proverbs loaded) may represent the ability to attend to critical variables, beyond the general level of cognitive competency, while attending to verbal instructions. Both ask a subject to be able to imagine concrete objects, but to manipulate those objects in abstract ways. Factor II (on which the largest number of measures saliently loaded) represents a merging of selective attention and sequential processing (Factors II and III of Examiner One), with

certain temporal processing skills. Factor II, then, may represent overall cognitive competence interacting with the ability to profit from direct instruction.

The remaining four factors all pertain to the temporal processing task - Diagramming Relations. The first of these (Factor III) appears to reflect the basic understanding of the task, while the remaining three each reflect a single type of item. It will be noted that the two item types which load on Factor III do not require the subject to understand the concept of "intersection of sets", while each of the remaining three items are measures of three different ways in which sets may be intersected. The four factors may again be interpreted as reflecting a competence-instruction interaction, since the basic task and each item type not only required slightly different skills but also were taught by slightly different sets of intructions.

Finally, it should be noted that the results of the factor analyses for Examiners One and Two can be interpreted as being to some extent complementary despite the marked differences in factor pattern. Not only can some of the effects of instruction be seen in Examiner Two's factor pattern, but in addition, (for example) the splitting of the Diagramming Relations task into four factors can be interpreted as reflecting the subtle shifts

in task demands within the overall test. Overall competence did emerge in Examiner Two's data as a single factor, with the two tasks least susceptible to examiner effect loading saliently on it. This factor split into processing factors in Examiner One's data.

Following the extraction and rotation of the six factors, factor scores were calculated for each subject. The scores were then clustered and the resulting groups examined. The report of the results of this procedure follows the report of the clustering procedures of Examiner One's data.

Cluster Analysis of the Sample:

Examiner One: The cumulative error function for the sample of inmates tested by Examiner One is found in Table 5. As may be seen in the table, the relative increase in error function indicated that either five or three clusters would represent acceptable groupings. Because of the extremely low number of subjects in one of the five clusters (one group contained three subjects), it was decided to investigate the characteristics of the three-group cluster analysis. These results are described in the next section.

Table 5: Cumulative Error Function
(Examiner One)

No. Groups	Error Function	E(n) - E(n-1)
(7)	(110.0)	
6	125.5	15.5
5	144.4	19.9
4	172.2	27.8
3	202.5	30.3
2	246.1	43.6
1	204.1	58.0

Characteristics of the Clusters: The multivariate analysis of variance of the set of "marker" variables for the three-cluster grouping and the Barltett-Box test were statistically significant (multivariate-F=8.838; df=32,166; p=<0.001; and Bartlett-Box value=540.76; df=272; p=<0.001). Because of the relatively unequal sample sizes of the clusters, the results of the multivariate analysis of variance should be interpreted rather cautiously. However, the magnitude of the multivariate-F is great enough to allow consideration of the results as valid.

The mean values for each of the set of "marker" variables, for each of three clusters of subjects, are given in Table 6, as is the statistical significance for each of the univariate analyses of variance which were performed subsequently. The fact that the three clusters were statistically significantly different on the cognitive "marker" variables is to be expected, since the

Table 6: Mean Values for Three Clusters on "Marker" Variables (Examiner One)

Variable	Group 1	2	3	p
Following Directions:				
total score	3.39	2.88	6.22	0.000
no. attempted	8.56	6.81	9.07	0.001
Ship's Destination:				
total score	24.28	6.61	21.57	0.000
no. attempted	32.06	15.23	29.81	0.000
Diagramming Relations:				
total score	2.50	1.67	4.74	0.000
no. attempted	7.83	5.82	9.26	0.000
comprehension level	1.94	1.47	3.48	0.000
Picture:				
level of interpretation	3.11	2.29	2.96	0.024
Fable:				
level of interpretation	2.94	1.72	2.70	0.000
Proverbs:				
level of interpretation-1	2.22	2.39	2.30	n.s.
level of interpretation-2	2.33	2.47	2.44	n.s.
Language Sample:				
No. of Words	246.2	213.5	236.1	n.s.
Mean Sentence Length	8.00	6.54	7.85	0.024
Percentage of Utterance				
at Stage 1	14.97	15.49	10.47	n.s.
at Stage 4	13.52	17.51	14.04	n.s.
at Stage 7	18.23	11.79	21.62	0.002
No. of subjects	18	57	27	

subjects were grouped according to factor scores which were derived from those very variables. The two significant differences within the five measures derived from the language sample indicates that there is a relationship between cluster membership (based on

cognitive variables) and score on mean sentence length and percentage of utterances at stage 7 (the highest stage in the Crystal analysis), just as was hypothesized. For example , Cluster III (which is characterized by relatively high scores on the cognitive tasks) was also characterized by the highest percentage of utterances at stage seven, and by a relatively long mean sentence length. Conversely, Cluster II is low on both cognitive and language measures, while Cluster I is intermediate in level.

In the analysis of the percentage of utterances at each of the seven stages, and the characteristics of the language within stage seven, multivariate analyses of variance were again performed. The analysis of the percentages of utterances was not statistically significant, unlike that of the characteristics within stage seven (multivariate-F=2.352; df=14,184; p=0.005). On the univariate level, each of the four characteristics of language within stage seven attained statistical significance.

The results of the two analyses are given in Table 7. As may be seen there, the results of these analyses generally provide evidence for the differences among the clusters. When measures derived from the cognitive tasks other than the "marker" variables, and those included in

Table 7: Language Characteristics by Cluster (Examiner One)

Measure	Cluster 1	2	3	p
Percentage of utterances at:				
Stage 1	15.0	15.5	10.5	n.s.
Stage 2	5.8	4.6	4.9	n.s.
Stage 3	17.0	16.7	16.6	n.s.
Stage 4	13.5	17.5	14.0	n.s.
Stage 5	22.2	26.4	25.2	n.s.
Stage 6	8.2	7.6	7.7	n.s.
Stage 7	18.2	11.8	21.6	0.002
Characteristics within Stage Seven:				
Quality of Discourse	3.50	3.08	3.70	<0.001
Use of Comment Clause or Emphatic Order	1.44	0.63	1.52	<0.001
Use of "it","there"	0.16	0.14	0.44	<0.001
Other stage seven	0.11	0.04	0.11	<0.001

the factor analysis are considered, the cluster characteristics become even more clear. For example, the percentage of each cluster who were able to recall the third and fourth elements in the fable reflects the general level of competence of each cluster; the relevant percentages are 50.0%, 31.6% and 63.0% for the third element (the prescription), and 44.4%, 22.2% and 55.6% for the fourth (the happy man had no shirt) (p-values=0.21 and .009 respectively), for each of the three clusters. Similarly, the percentages of each cluster who recalled the fable in a correct sequence were 22.8% and 50.9% for clusters II and III respectively (p=0.029). The percentage responding to the fable in an abstract fashion

also varied significantly among clusters (percentages=55.6%,17.5% and 40.7%, p=0.004 for clusters I, II and III respectively).

When the differences among the clusters, on the basis of the personality, intelligence and demographic variables, were examined, only two statistically significant differences were revealed (sex composition of clusters, and Verbal IQ score on the Weschler Adult Test of Intelligence). Although both findings could have occurred by chance, each is readily interpretable. That is, more women were found in cluster III (the most competent of the three clusters), and the verbal IQ score in this cluster was higher. There were no differences on personality measures (the 13 MMPI scales), and no differences among the clusters on length of sentence, age, years of schooling, general type of crime committed, performance measures of intelligence, nor on the number of Native Indians per cluster.

From the above results, it is possible to describe the basic cognitive and linguistic characteristics of each of the three clusters.

Cluster I: This cluster is characterized by a mixed pattern of cognitive ability. They tend to be competent

in selective attention, but not in sequential or temporal ordering of information. The level of cognitive complexity appears to be at a transition point, between the concrete and concrete-abstract levels. These subjects are capable of a low level of interpretation of linguistic information. There may be a motivational component underlying performance in this group, since the most interesting and "real" task, appearing last in the session, was also the measure on which the members of this cluster performed best.

The language of this group is not as proficient as that of Cluster III (the most competent cluster). Members of this cluster appear to have a mixture of adequate and inadequate language structures. However, their language does not lack clause structure to the extent of that of Cluster II (the lowest group). The inmates of cluster II are delayed at the word, phrase, and sentence level of development and make many articulation errors. The content of their themes tends to be that of literal description. They tend to use favorite categories of syntactical structures to the exclusion of other structures.

A portion of the language sample from a member of this cluster is:

Examiner: (response to question) Anything. There's no right or wrong answer.
Inmate: Tell you something about her.
E: MmHm.
I: Anything.
E: Anything.
I: OK. She looks like an older lady to me.
E: MmHm.
I: Quite old and..uh..right now she looks like she's on a farm and bin around. Looks like she's bin through a lot of hard times...OK...uh...to me she looks like a woman that would uh..... be very cranky at....the way she's looking now but uh....the way she may be in a person would be different but right now she looks like...ta me a woman that would be a very cranky woman and uh... well I guess...huh...that's about all I can say really.

Cluster II: This group of subjects is characterized by a generally low level of performance. They evidence difficulty on the cognitive measures requiring them to sequence, to see relationships, and to manipulate several details simultaneously. Their interpretive language level tends to be early concrete descriptive.

These subjects have few complex sentences (at the Stage 7 level). Most of their utterances are either disjoint phrases or simple declarative statements. Connectivity between statements is often absent. They evidence incorrect word order, and fewer morphological transformations at the word level. There is the occasional "sophisticated" word use, but it usually is within an inadequate context (e.g., a sentence with a missing noun or verb phrase). There appears to be a

plateau in sentence development. Sentence fragments most frequently occurr in this group. They rarely use the passive voice. They seem to have difficulty in expressing the relevant, even in descriptive language.

A sample of natural language from a member of Cluster II which illustrates these characteristics is:

Examiner: (response to question) There it is.
Inmate: Goin' on now is it?
E: Yes.
I: Uh....this must be a gardener, right?
E: MmHm.
I: She can't be growin' flowers....she only got one.....uh...
E: MmHm.
I: She seems happy.....
E: MmHm.
I: .....must be in her eighties.....
E: She seems pretty old all right. OK That's good about her. Now, tell me about this fellow right here.
I: Looks like a mountain climber.
E: MmHm.
I: So you wan me to tell you what he's goin', right?
E: Yeah, anything you can think of about him.
I: .....
E: What do you think he's doing on the rope there?
I: .....he's sitting there...
E: MmHm.....What do you think he's looking at?
I: Probably the camera.....
E: OK.

Cluster III: This group of subjects are generally more competent,than the other two groups; but nevertheless do not possess adequate language at the average adult level. Their cognitive abilities and their developmental language competence is at a higher level than the other

two groups. They are able to selectively attend; temporal and sequential processing are somewhat more intact, and they can understand and express some abstract ideas.

Although their vocabulary level may not be semantically any more sophisticated than that of the members of Clusters I and II, they have reached the highest level of the three groups on the Crystal analysis. That is, they produce a relatively large number of correct, complex sentences. The sentences, however, may utilize the simple repetitive use of the conjunction. Temporal relationships are expressed, but these are often faulty. In the members of this group, the clause level may have been developed before the phrase level was very strong. This tends to result in limited discourse.

A sample of the language from a typical member of this cluster is:

Examiner: ....an I record it so I don't have to write it down. OK. Tell me about this picture.
Inmate: What do I see in this woman?
E: Not what you see in her. Just make up a story about her.
I: My father. She looks like my father. A little bit. Just the glasses I guess. She looks like she's happy anyway...She's an old lady. She's pretty old. She's suffering from arithritis I can see. Looks like it anyway. She's a farmer anyway, being on a farm...She looks like she's in a kinda...in pain you know, like ...uh...hard to explain like she's got that...I guess she seen too much. I dun know....
E: MmHm.
I: She likes flowers. She's still got the old-fashioned

clothing on so she's still..uh..I don't know if you could call it conservative-minded or whatever you wanna call it, liberal or she still lives back from the past. She doesn't mind wearing a man's cap so that she doesn't care what other people think. She doesn't care what she looks like. She doesn't wear no make-up. ..uh..she looks strong for one, like she's got really big hands if it's a she.

E: It is.

I: I guess it's a she, yeah..She's got really big hands for a woman, of her age especially. She's pretty old, unless she's got some kind of disease but I think that it's old age.

E: That's very good.

Despite the clustering of the inmate sample into three groups of varying levels of competence, it is important to note once again that all three clusters are comprised of subjects who are generally low in cognitive competence and syntactic complexity. In comparison to normal adult language development, each group used fewer sentences with subordinate clauses; most sentences were sentences of simple coordination. The comparative was never used by any of the subjects. Further, they all had problems in the usage of familial, passive, and temporal constructions.

All subjects had fewer scorable morphographs than would be expected in average adult speech. There were more minor sentences and sentence fragments in proportion to full major sentences than are found in average adult speech. There were no differences in cluster membership

due to race. Most subjects used little fantasy or imagination in their language expression. These characteristics appear to be a further reflection of the very literal-descriptive nature of the subjects' speech and the inadequacy in temporal processing.

Examiner Two: The cumulative error function and the change in the cumulative error function for each of six groups and fewer, is reported in Table 8. As may be seen

Table 8: Cumulative Error Function
(Examiner Two)

No. Groups	Error Function	E(n)-E(n-1)
(7)	391.7	
6	428.7	37.0
5	466.9	38.2
4	519.1	52.2
3	572.6	53.5
2	646.7	74.1
1	760.4	115.7

there, the increase in error function indicated that three groups would be acceptable. The characteristics of the three clusters are described in this section of the report, in rather general terms. The descriptions are general because of the resemblance of the three clusters to those revealed by clustering of the data collected by Examiner One.

The multivariate analysis of variance of the set of "marker" variables for the three-cluster grouping and the Bartlett-Box were statistically significant (multivariate-F=2.47; df=32,194; $p<0.001$; and Bartlett-Box value=236.15; df=136; p=0.003). Again, the significance of the Bartlett-Box test combined with the unequal sizes of the clusters means that the results of the multivariate analysis should be interpreted with a degree of caution. This caution is to some extent overridden by the very low p-value associated with the multivariate-F.

The mean values for each of the set of "marker" variables, for each of the three clusters, are given in Table 9. Table 9 also contains the statistical significance for each of the univariate analyses of variance which were performed subsequent to the multivariate analysis of variance. As may be seen there, six of the eleven cognitive measures achieved statistically significant differences, as did only one of the five "marker" language measures.

Characteristics of the Clusters: Further characteristics of the clusters were examined in a manner similar to that performed for Examiner One's data. That is, the percentage of utterances at each of the seven

Table 9: Mean Values for Three Clusters on "Marker" Variables (Examiner Two)

Variable	Group 1	2	3	p
Following Directions:				
total score	3.68	4.48	4.84	0.013
no. attempted	8.16	8.77	9.06	n.s.
Ship's Destination:				
total score	11.35	16.62	22.12	0.000
no. attempted	23.72	29.14	31.15	0.012
Diagramming Relations:				
total score	2.60	4.57	5.57	0.000
no. attempted	9.72	9.94	10.00	n.s.
comprehension level	2.06	3.37	3.57	0.000
Picture:				
level of interpretation	3.27	2.94	3.63	n.s.
Fable:				
level of interpretation	2.16	2.57	2.91	n.s.
Proverbs:				
level of interpretation-1	2.21	2.22	2.54	0.002
level of interpretation-2	2.41	2.34	2.55	n.s.
Language Sample:				
No. of Words	292.3	268.1	322.6	n.s.
Mean Sentence Length	8.37	9.14	9.30	n.s.
Percentage of Utterance				
at Stage 1	11.71	10.22	10.83	n.s.
at Stage 4	11.67	10.99	10.94	n.s.
at Stage 7	17.61	25.05	26.11	0.029
No. of subjects	50	35	33	

stages, the characteristics of language within stage seven, some characteristics of recall of the fable, response to the picture, and the various demographic and psychometric variables were examined using a combination of multivariate and univariate analyses of variance.

The results of the multiariate analyses of variance of the percentage of utterances at each stage, and of the characteristics within stage seven were not statistically significant. The means and the results of the univariate analyses of variance for each measure included in the two analyses are given in Table 10. These results are tabled

Table 10: Language Characteristics by Cluster (Examiner Two)

Measure	Cluster 1	2	3	p
Percentage of utterances at:				
Stage 1	11.7	10.2	10.8	n.s.
Stage 2	3.0	2.5	3.1	n.s.
Stage 3	18.1	13.7	11.0	0.021
Stage 4	11.7	11.0	10.9	n.s.
Stage 5	28.0	27.6	30.1	n.s.
Stage 6	9.9	9.8	8.1	n.s.
Stage 7	17.6	25.0	26.1	0.029
Characteristics within Stage Seven:				
Quality of Discourse	3.56	4.31	6.24	<0.014
Use of Comment Clause or Emphatic Order	1.29	1.54	1.33	n.s.
Use of "it","there"	0.19	0.37	0.24	n.s.
Other stage seven	0.10	0.06	0.15	n.s.

simply to facilitate comparison of the clustering procedures of the two examiners.

The results of the examination of the measures derived from the interpretation of the fable are generally

similar to those resulting from analysis of Examiner One's data. That is, a higher percentage of cluster III successfully recalled elements three and four, and recalled them in the correct sequence. More, also, gave a correct abstract interpretation.

More women are found in cluster III. Apart from this single finding, there were no statistically significant differences among the clusters on any of the personality, demographic or intellectual assessment measures, or on the number of Native Indians per cluster.

When the results are compared to those of Examiner One's subjects (Table 6 and 7), they may be interpreted in a generally similar fashion. Thus, cluster I resembles the least competent cluster of Examiner One (her cluster II), while cluster III (the most competent) is like Examiner One's cluster III. Similarly, the remaining cluster from each examiner's data are similar. However, the differences among Examiner Two's clusters are less sharp.

For example, when Examiner One's cluster II is compared to Examiner Two's cluster I (both least competent), both clusters score lowest of the sets of clusters on most (12 and 11 respectively) of the marker measures. However, when the levels of statistical significance across examiners, for the various measures,

are compared, Examiner Two's clusters are generally less different, since four fewer of the measures achieved a statistically significant difference.

Comparisons with Control Subjects:

Specific categories of control subjects were sought for comparison in this study. Because there appears to have been no investigation of the frequency of learning disabled adults either in the general population or in prison populations, control subjects were used in this study only for the purposes of making descriptive comparisons, rather than for that of concluding about relative incidences. The following section is dedicated primarily to the demonstration of qualitative differences between the various groups,. in order to allow more detailed discussion of clinical patterns.

The three control groups for whom data was was collected were:

1. normal adults, who were not inmates
2. normal adults, who were inmates
3. learning disabled subjects, who were not inmates

In addition, data was collected from several individuals who were not learning disabled, but who had other

disorders.

Table 11 contains the means of these three groups of subjects, for the three cognitive tasks. To allow easy

Table 11: Mean Scores by Group Characteristic

Group	Task			
	Diagr. Relns.	Foll. Dirs.	Ship's Dest.	n
Normal subjects:				
Inmates	6.33	6.17	27.67	17
Non-inmates	6.65	7.96	28.12	54
Learning Disabled Subjects:				
Inmates (Examiner 1)	2.63	3.82	13.51	102
Inmates (Examiner 2)	3.83	4.12	15.53	118
Non-inmates	4.14	3.00	15.75	15
Clusters of L.D. Inmates (Examiner 1):				
I	2.50	3.39	24.28	18
II	1.67	3.82	6.61	57
III	4.74	6.22	21.57	27

comparison with the means of the inmate learning disabled subjects who were the focus of this study, the means obtained by the two examiners are repeated in the table. In addition, the means on the cognitive tasks for Examiner One's three clusters are found in Table 11.

From this table, it is evident that normal adults and normal inmates are both generally more competent on cognitive tasks than the three groups of learning disabled. If we accept these mean scores as approximately the expected scores for normal adults, it may be concluded

that the three learning disabled groups are less competent that would be expected for adult performers.

The learning disabled non-inmates' scores were very similar to those of the subjects selected for inclusion in the study. When we also take the similarities in behavioural characteristics of these inmates to learning disabled adults into acccunt, this finding provides further evidence for the conclusion that some inmates are learning disabled, and for the relationship between cognitive processing factors and learning disability. Further, the low overall means obtained by both examiners as compared to the normal groups of subjects lend more support to the conclusion, presented earlier in the report, that the selection process is valid.

Within the comparison group of non-inmate learning disabled, it was possible to select subjects whose score profiles were rather similar to one or another of the three clusters of the inmates obtained by analysis of examiner one's data. For example, one subject obtained a total score of 3 on diagramming relationships, 0 on following directions, and 31 on ships destination. This subject is clearly similar to the subjects of Cluster I (the intermediate cluster). A second learning disabled subject, who scored 2 on diagramming relation ships, 0 on following directions, and 9 on ships destination, is most

like inmate Group II (the least competent). It seems likely that the investigation of the utility of the cluster profiles for purposes of treatment planning may not be limited only to incarcerated subjects.

Descriptions of Individual Cases:

In order to describe more fully the cognitive and language characteristics of the various comparison groups, seven short vignettes will be presented. Each contains clinical information about a single subject. They are included here in order to emphasize that language and cognitive deficits appear more likely to be related to process deficits giving rise to learning disabilities, than to residence in prison, ethnic origin, educational experience, or presence of pathology.

I. Average Adult. This eighteen year old girl had just graduated from grade 12. Her scores were: DR=8, FD=10, SD=48. These scores are somewhat above average. She is from a middle-class background with no evidence of learning disability or juvenile delinquency. The percentage of scores above stage 5 on the Crystal analysis is 75. This places her at the average adult level in syntactical development.

II. Psychopathic Incarcerated Adult. This man is

25 years old and has been in prison many times. He has recently been diagnosed as a psychopathic personality by clinical examination. He has average mental ability. His scores are: DR=7, FD=8, SD=45. His educational level was a modified grade 10. He comes from a working class family. His language analysis revealed that 65 percent of his responses were above stage 5 on the Crystal analysis. This places him, despite his severe personality disorder above the selected inmate groups on both language and cognitive tasks.

III. Uneducated Adult. This man is 27 years old, an exotic dancer and was suspected of having a learning disability. He had left school in Grade 4 and had done little reading since. His wife suspected that he did not read because he had a learning disability. Diagnostic tests revealed no learning disability. He did suffer from learning deficits because of basic academic skills that he had missed by not attending school. Recommendations were for an upgrading course in an Adult Basic Education class. His scores were DR=9, FD=7, SD=45. He had 67 percent of his verbal responses above a stage 5 on the Crystal analysis. This man had spent no time in jail, yet his language and cognitive development was very similar to the preceeding man. Educational level, although different for

both men also does not seem to cause them to have deficient language or cognitive development at this basic level.

IV. Neurotic Adult- This man was referred to the investigator because he was failing in a course of study at one of the local colleges. He believed this was because he had a learning disability. He seemed to desperately need an external excuse for lack of satisfactory performance. MMPI results and clinical examination revealed that this man had no limitation in mental ability, and no learning disability, but he did evidence strong neurotic traits, with a tendency to somaticize his anxiety states. His scores were DR=8, FD=7, SD=43. His language score was the highest in the group with 81 percentage of his responses above stage 5. This man was generally as competent as the first case, but no more so than the second and third cases insofar as cognitive processing is concerned. He does have some additional strength in language as compared with the other subjects. This appears to be because of his wide reading experience, which has enriched the language structure of his spoken language. For many adults this seems the most effective way to acquire expanded language structure. Treatment for this man consisted of a tutor for a short

period to help him develop structured study skills and a plan of attack for taking examinations, coupled with a brief period of supportive interaction. This man is now successful in school.

V. Incarcerated Native Woman. This 43 year old woman was serving a life sentence when she was seen. She had a Grade 8 education and had not been in a school program of any kind for some time. She thoroughly enjoyed all tasks, and indicated that she liked puzzles and problem solving situations of any kind. She read detective novels for amusement. Her scores were: DR=10, FD=8, SD=36. Her language score was 66 per cent of responses occurring above the stage 5 level. It was the belief of this examiner that the language score would have been even higher if the sample had been taken at the end of the interview rather than at the beginning. When she relaxed, her sentences became longer and more complex. Her semantic density was among the highest in the study. Also her usage of symbolism and fantasy was the most advanced. This woman is included in the examples to illustrate that the language differences found within the prisons were not due to racial differences. In fact, there were no racial differences found with regard to either cognitive processes or language.

VI. Learning Disabled Non-inmate. This 41 year old man was bored in a nonchallenging job, but seemed unable to learn a more complex job higher up in his organization. His wife, after taking a course in learning disabilities from the author of this report, asked that she see him. This man does have a learning disability in all three processes of selective attention, sequencing and temporal relationships. His scores were: DR= 4, FD=3, SD=29. His percent of utterances above stage 5 was 53. This man's pattern of scores is much like the inmate Group I. An inspection of the qualitative aspects of his language indicates many similarities. He is presently receiving instruction from a remedial specialist, who is using the content of his intended new job as the curricular base within which to increase his language and cognitive competence.

VII. Learning Disabled Incarcerated Juvenile. This 17 year old man was sentenced for the first time to 6 months in a farm placement. He was first diagnosed as learning disabled when he was 6 years old. Most of his school life was spent in special classes. However, in spite of this, he did not improve academically and was almost a nonreader. Examination revealed that he had a learning disability, that was interferring broadly with

his learning life. It appeared to have affected his vocational and social learning skills to as great an extent as his academic training. His scores were: DR= 5, FD= 1, SD= 16. The percentage of utterances above stage 5 for this young man was 46. The presence of cognitive process dysfunction was substantiated by these scores. Task analysis of learning difficulties substantiated these findings. The court was accommodating in this case and this young man was able to receive specific training in language and cognition while incarcerated.

These brief sketches are intended to expand the argument that the inmates chosen for this study are, in fact, a select group. They do appear to have language and cognitive deficits that are not related to psychopathology, years in school, ability, race, or the fact that they are incarcerated. Table 12 gives a summary of the scores of the seven subjects, in addition to the overall means obtained by the two examiners.

While this study has not attempted to estimate the incidence of learning disabilities in the incarcerated adult, we do know from other research that it is reasonable to hypothesize that about 2% of the general adult population have learning disabilities. This is an extrapolation from childhood figures, reducing it somewhat

Table 12: Scores of Comparison Subjects

Subject	Scores			
	Diagr. Relns.	Foll. Dirs.	Ship's Dest.	Utter.: % above Stage 5
Normal subjects:				
I	8	10	48	75
II	8	7	45	65
III	7	9	45	67
IV	7	8	43	81
V	8	10	36	66
Learning Disabled Subjects:				
VI	3	4	29	53
VII	1	5	16	46
Inmates (Examiner 1)	2.63	3.82	13.51	48.8
Inmates (Examiner 2)	3.83	4.12	15.53	59.9

due to the developmental eradication of some kinds of learning disabilities as children mature.

If the inmates identified in this study do have learning disabilities, or learning disability-like language and cognitive difficulties, then we should be impressed by the numbers identified in each prison in this study. It must be assumed that there are more individuals in prison, than were identified, who share similar characteristics; but who, for a variety of reasons were not selected for the interviews. There seems little reason to doubt that the numbers of inmates found in this study, as well as a larger total number if an exhaustive search were undertaken, justifies the belief that learning disabilities of a cognitive processing type do exist in

sufficiently large numbers to be of concern when delivering rehabilitative services in the prison system.

CHAPTER V

DISCUSSION AND IMPLICATIONS

Research into learning disabilities in many ways is still in its infancy. There are problems of definition, etiology, measurement and treatment. This is particularly true if one is interested in the adult learning disabled individual. If we are concerned about the relationship between learning disabilities and crime there exists a paucity of information. For example, Coons (1981), in his extensive review of the literature, could find no studies that dealt with the adult offender who was learning disabled.

Research studies conducted with juveniles have yielded mixed results, but little to strongly substantiate the clinical intuitions of people who work with learning disabled youths in rehabilition or education programs. This may be because the research has investigated only academic variables, and has consequently employed measures that are likely to eliminate the very subjects of interest to the investigator.

The use of procedures of strictly random selection

when the incidence of the disorder is not known, combined with the administration of instruments of questionable validity, has tended to decrease the number of correct "hits" as compared to the number of incorrectly identified subjects. The result of such flaws in research design is that the primary effect is often lost, and no support is gained for the presence of learning disability among juvenile offenders.

The conclusion that an individual is learning disabled is usually formed in one of three possibile ways:

1. Discrepancy - Does the individual have a discrepancy between expected and actual achievement? The problems experienced with this as a criterion is that there are many reasons why an individual will have less than expected achievement, learning disability being only one of them. There is also difficulty in measuring ability levels in learning disabled people. Most measures have tasks that interract with their disabilities to give inaccurate estimates of an individual's true ability. Likewise measures of achievement tend to be of academic achievement only, and may not accurately measure the domain of information for which this individual should be responsible. To administer the same measure to two adults when one has been out of school for 10 years and the other only 2 years is unfair to the former. The usage of

academic achievement measures, has been criticized earlier by this researcher because inability in reading etc. are seen as symptomatic of the learning disability, not synonymous with it or a developmental manifestation or direct measure of the disability.

2. Exclusion - Many authors define what a learning disability is by telling who cannot have one,(ie the emotionally disturbed, mentally retarded person etc.) or what it is not. The difficulty here arises when we realize that the learning disabled person may have a multiplicity of difficulties, and can be mentally retarded, for example, as well as learning disabled. Also if we are to develop treatment programs we need tobe able to describe exactly what the learning disability is and how it affects the learning pattern of an individual.

3. Process deficit -is the definition most acceptable to this investigator for purposes of understanding the disorder, and for purposes of identification and treatment of individuals who may represent it. These people have a deficit in one or more essential cognitive learning processes which often limits their ability to receive information, to understand or interpret it and finally to express it in a meaningful way. This has been interpreted in this study as these individuals have disorders in one or more psychological processes that involve spoken or

written language, and higher cognitive development.

It remains to be demonstrated, that process function is the base of language disability and cognitive development. This study was initiated to investigate several related concerns of this problem.

A. The usability of a list of behaviour characteristics for the initial identification of subjects, rather than by random selection using standardized instruments as screening devices.

B. To determine if these people did have lowered syntactic abilities as compared to normal adult speech.

C. To determine if these people also demonstrated lower scores on measures of cognitive ability.

D. To determine that these differences were not due to other constitutional factors in the individuals' lives, such as emotional difficulties, mental retardation, sex, age, race etc.

Findings:

Factor analyses allowed the researcher to look at the interrelationships among the language measures, and the cognitive measures to see what underlying structures seemed to exist. It was anticipated that these factors

would be those of the cognitive processes, selective attention, sequencing and temporal processing. The data demonstrated this to be a likely explanation of the outcome of the factor analyses.

Initial data analysis using univariate techniques established a significant positive relationship between language and cognitive marker variables for both examiner one and examiner two. If an inmate did poorly on language he did poorly on cognitive tasks as well. All inmates scored lower than control subjects who were not learning disabled, but who may or may not be in prison.

Examiner two was instructed by the investigator to teach the first of the cognitive tasks in its entirety, allow additional time on the second two tasks while answering questions and providing hints as to what they might try as strategies to arrive at answers. She also was asked to question the subjects during the language sample providing a language model by which it could be determined if the subject spontaneously imitated the language pattern she provided.

Because of the differences in the administration of these measures, there was a significant difference in scores was found between examiners, such that the data were treated separately from that point in the data analysis.

Factor analyses of examiner one's cognitive and language data revealed four factors as the most promising explanation. These appeared to be best described as selective attention, sequencing, temporal processing, and complexity. As a result of this outcome, the validity of the instruments was further substantiated and the validity of the construct of process dysfunction in persons with the characteristics of learning disability was more firmly established.

Cluster analyses on examiner one's data revealed three groups of subjects within the inmate population. All three groups were inadequate in language and cognition as compared with normal subjects in and out of prison. The three groups did differ on their patterns of language and cognitive skills. One group was significantly lower than the other two on both language and cognitive skills. A second group was generally more competent than the first but was differentiated mostly by degree of impairment of these functions. The third group was a combination of the two. They had mixed profiles and appeared to be either less motivated than the second group or in a developmental transition.

Multivariate analyses of these three groups revealed that they did not differ on any of the constitutional

variables, including race, IQ, personality measures, or years in school. This would seem to indicate that these persons scores on the cognitive and language measures was an unconfounded representation of their learning profile.

The data analysis of Examiner Two's data was interesting. The method of administration was varied to determine if there was any benefit to be attributed to dynamic vs static assessment. Examiner one could be said to use static standardized rules and Examiner two used a teaching model. It has been argued by Feuerstein (1979) and others that the educationally disadvantaged, especially those from socially and environmentally different backgrounds are severely penalized and underestimated by the use of static assessment.

This investigator agreed with the above ideas in a general way, but questioned the utility of teaching the tasks in a testing environment, if one was interested in differential diagnosis. If the purpose is to judge learning rate, or some other related educational correlate then this procedure seems reasonable. However, if one is trying to determine the nature of a particular individual's learning problem, then we need clear measures with known standards of proficiency.

The analysis of Examiner two's data seemed to indicate that this was true. Factor analyses yielded as

best fit, 6 factors. The best description of them appears to be complexity of task, difficulty level and several aspects of specific task characteristics. Thus we do get information about the difficulty level of these tasks for the inmate sample and also something about the educability of these subjects on these tasks. However, while you learn a bit about the measures, you learn very little about the people themselves. We know that they are not as competent as the normal controls, but in what important ways they differ is much less clear.

With these findings all research questions have been answered, and are found to be in the hypothesized direction. It appears that these individuals may reasonably be said to have process dysfunction often referred to as a learning disability. It also seems that they differ from one another on the qualitative patterns they provide on the language and cognitive measures but are generally inferior on these measures to non-learning disabled people in and out of prison.

Limitations: The foremost limitation of this study was the developmental measuring device authored by D. Crystal. While we were able to determine deficient syntactical abilities in these inmates and others we were not able to describe in enough detail just what the quantitative syntactical difficulties were at the stage 7

level. Re-reviewing the literature did not reveal any existing measure that would have done a better job. At present the author of this report has a doctoral student doing his dissertation on the development of an instrument for measuring the adequacy of adult syntax. We look forward to its use in further research in this field

As a result of the above quantitative limitation, analyses of the language of the three groups, and the control stujects was done qualitatively and matched to the known language characteristics of learning disabled people. There was an excellent match found within all of the syntactical, morphological and annecdotal information suggested by the literature. The inmates in this study did demonstrate "learning disabled speech patterns." They were poor in syntax, used restricted numbers of sentence types, understood and used literal concrete language only, and used sentences of shorter length than normal adult speakers.

The use of the behaviour profile technique was encouraging in-so-far as it enabled us to identify correct subjects. However, it is suspected that some of the characteristics are more representative of the learning disabled inmate than others. In subsequent studies, it would be useful to have each subject chosen identified with the characteristics most salient to his behaviour.

In this way some characteristics would likely be dropped from the list and others expanded.

There is also the possible problem of restricted range due to the selection procedures followed. However, if this affected the study in any way it would have been to have made differences more difficult to demonstrate. Thus it is possible that the effects might have been even more extreme if we had done a completely random selection using the now established valid instrumentation.

Implications If this study is to be of value it must progress beyond the demonstration of interesting relationships to more applied goals. If learning disabilities do exist in adults and if these are demonstrably those of selective attention, sequencing, and temporal processing, then it behooves us to inquire as to how we may alter the situation so as to render these individuals more competent.

This is especially true if the language of the individuals and their cognitive problem solving skills have been affected. If these developmental skills are not present so that they can learn as others do then educational programs of a general remedial nature will not

be successful in ameliorating the learning difficulties of learning disabled persons.

Learning disabled adolescents are said to not commit more crimes than other juveniles, but appear disadvantaged before the courts and are more likely to be sentenced. We should then expect to find more learning disabled persons in the prisons than would be normally occurring in the population not in prison. This is especially true as we know that these individuals adapt to the structure of the prison well. Eighty percent will be re-arrested and will likely return to prison (Berman, 1978).

It is the opinion of this researcher that future research in this area should have two major thrusts.

1) Developmental Training Program. The first step should be the refinement of the language instruments, behaviour classification list, and the inclusion of personality measures because of the great similarities in the cognitive problems of these people to the affective lives they lead. When this step is completed the measures should be used again in the federal prisons to locate good candidates for whom a remedial program will be developed on a demonstration basis in at least two federal prisons. This program should have as its major goal the increased competency of its subjects in the syntactical aspects of language, with materials so structured that the cognitive

processes of selective attention, sequencing, and temporal processing would be taught through direct instruction as well. The context in which the language material should be used is that of cognitive problem solving starting with training simple direct questioning, to the development of strategy formation and inductive logic. The content of the program will be all possible learning environments of the individuals life, from academic and vocational, to interpersonal.

When it has been demonstrated that these persons can be found and their learning behaviour modified, then the most important thrust of the research can be begun.

Crime Prevention Among Juveniles. Learning disabled juveniles are more likely than other delinquents to be imprisoned. They also return to prison at alarming rates. Their learning deficiencies seem to be rooted in faulty process functioning, that has affected their language and cognitive competence. If they are dysfunctional because of faulty learning, then a learning model specifically structured to teach them those skills that they did not pick up during formal school instruction seems a reasonable treatment model. These individuals should be considered "at risk" in our society and every attempt should be made to ameliorate their learning problems as early as possible in order to eliminate one possible

precursor of delinquent behaviour.

A second study is thus indicated. Learning disabled adolescents should be identifed at the point of their first delinquency and treated by an educational program designed to increase their language and cognitive competency instead of sending them to an environment where the major deterrent to further crime is containment or work experience without educational training of an academic or vocational nature. These youths would be identified using the same techniques and instruments as would be used with the adult offenders. Again, as with the adult learners, selected groups would receive treatment, and other groups would not in order to measure the differential compentencies of the youths over time as a result of training. As well, incidence of further encounters with the law would be recorded as additional support for the rehabilitative success of the training program.

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APPENDIX A:
UNIVARIATE INTERROGATIONS OF THE DATA

Before any attempt was made to interrogate the data in the search for relationships between the cognitive and the language variables, the data were examined for statistically significant differences which could be attributed to differences among the inmate sample in prison, sex or race of inmate and examiner. Because of the large number of measures which were derived from each of the cognitive measures, and the language sample, and the resulting high degree of linear dependance among the set of variables as a whole, the subset of "marker" variables was taken as being representative of the entire collection.

Differences Due to Sex and Race of Inmate:

The multivariate analyses of variance revealed that there were no statistically significant differences which could be attributed to sex or race of inmate. Further, the results of the Bartlett-Box tests (the multivariate analogue of a univariate test for heterogenetiy of

variance) revealed that there were no significant differences in the variance-covariance matrices of the two sub-groups, for either sex or race. When sex of inmate was considered, these results were obtained both for the full sample of male inmates, and for a sample (n=25) of these subjects. Consequently, the two groups were merged for further analysis and no differences due to sex of inmate are included in this report. The non-significant effect of race of inmate was obtained both for the full sample of Caucasian inmates, and for a sample (n=50) of these subjects. No differences due to race are included in this report.

Differences Due to Prison:

The multivariate analysis of variance revealed that differences due to prison were statistically significant (multivariate-F=2.579; df=128,1546; p=<0.001), as was the test of equality of variance-covarance matrices (Bartlett-Box value=1082.3; df=680; p=<0.001). A large proportion of the univariate tests of statistical significance also achieved probability values of 0.05 or less; these values, together with the mean scores for each prison are reported in Tables A-1 and A-2.

The statistically significant differences described above are not a reason to analyze the data separately by

Table A-1: Mean Values for Prisons
on "Marker" Variables (Prisons 1-5)

Variable	Prison 1	2	3	4	5
Following Directions:					
total score	3.69	4.21	5.18	3.83	4.74
no. attempted	8.76	9.44	9.39	8.40	8.65
Ship's Destination:					
total score	15.15	16.41	23.03	15.03	16.30
no. attempted	31.31	27.34	33.54	26.50	25.39
Diagramming Relations:					
total score	3.31	3.96	4.63	2.87	3.73
no. attempted	10.00	9.24	9.69	8.37	8.74
comprehension level	2.23	2.72	3.00	2.27	3.00
Picture:					
level of interpretation	3.31	2.69	3.33	3.50	3.30
Fable:					
level of interpretation	1.92	2.31	2.94	2.53	2.39
Proverbs:					
level of interpretation-1	2.38	2.28	2.42	2.27	2.47
level of interpretation-2	2.38	2.48	2.61	2.23	2.48
Language Sample:					
No. of Words	238.2	274.2	354.9	220.1	221.4
Mean Sentence Length	10.62	9.17	8.58	8.40	9.35
Percentage of Utterance					
at Stage 1	9.01	6.97	10.62	11.48	13.33
at Stage 4	12.58	11.24	10.39	10.36	13.18
at Stage 7	26.45	19.14	26.16	24.93	26.23

prison. Rather, these differences constitute a validation of the reason for sampling from institutions across Canada. That is, in some way institutions come to acquire an inmate population whose characteristics seem to be unique to that institution. Consequently, any research project which is designed to reveal information about a

Table A-2: Mean Values for Nine Prisons on "Marker" Variables (Prisons 6-9)

Variable	Prison 6	7	8	9	p
Following Directions:					
total score	3.83	3.93	3.34	3.53	0.003
no. attempted	6.08	7.33	7.59	6.87	<0.001
Ship's Destination:					
total score	11.08	14.47	11.72	8.44	<0.001
no. attempted	17.75	22.73	21.93	16.50	<0.001
Diagramming Relations:					
total score	1.42	3.27	2.66	3.28	0.002
no. attempted	4.92	7.87	8.53	8.06	<0.001
comprehension level	1.42	2.87	2.22	2.31	0.023
Picture:					
level of interpretation	2.17	3.47	2.06	2.94	<0.001
Fable:					
level of interpretation	2.00	3.27	1.81	2.01	0.005
Proverbs:					
level of interpretation-1	2.41	2.27	2.25	2.22	n.s.
level of interpretation-2	2.67	2.33	2.37	2.44	n.s.
Language Sample:					
No. of Words	154.0	324.2	208.2	291.7	0.001
Mean Sentence Length	5.83	7.80	6.41	5.88	<0.001
Percentage of Utterances					
at Stage 1	13.33	14.95	18.44	13.45	0.001
at Stage 4	22.09	17.94	17.08	12.69	<0.001
at Stage 7	9.01	14.73	10.89	11.74	<0.001

greater proportion of the population than is present in certain prisons only, should sample from institutions across the country.

Differences Due to Examiner:

The results of the multivariate analysis of variance

revealed that there were statistically significant differences between examiners (multivariate-F=5.28; df=16,202; p=<0.001), and, further, that the test of equality of the variance-covariance matrices was statistically significant (Bartlett-Box value=401.6; df=136; p=<0.001). Once again, the significant results of the Bartlett-Box test did not invalidate the results of the multivariate analysis of variance, because of the near-equality in sample sizes for the two examiners. A number of the univariate tests of statistical significance achieved probability values of less than 0.05; Table A-3 contains the mean values and the results of the univariate tests for each measure, for each of the two examiners.

From the description given in Chapter III, it will be recalled that examiner one followed a standard testing procedure, in which a brief attempt was made to explain the Diagramming Relations test by using the first five questions as examples, followed by a more traditional administration of the balance of the cognitive and language measures. Examiner two followed a procedure in which not only were all fifteen of the items in the Diagramming Relations measure taught to the subject, but more time was given on the Following Directions and Ship's Destination tasks. Further, examiner two took advantage of opportunities to provide linguistic modelling

Table A-3: Mean Values for Two Examiners on "Marker" Variables

Variable	Examiner 1	Examiner 2	p
Following Directions:			
total score	3.83	4.13	n.s.
no. attempted	7.72	8.60	0.005
Ship's Destination:			
total score	13.51	15.53	n.s.
no. attempted	21.98	27.69	0.002
Diagramming Relations:			
total score	2.63	3.85	<0.001
no. attempted	7.05	9.89	<0.001
comprehension level	2.06	2.74	<0.001
Picture:			
level of interpretation	2.62	3.28	<0.001
Fable:			
level of interpretation	2.20	2.49	n.s.
Proverbs:			
level of interpretation-1	2.33	2.31	n.s.
level of interpretation-2	2.44	2.44	n.s.
Language Sample:			
No. of Words	228.3	292.2	0.003
Mean Sentence Length	7.14	8.86	<0.001
Percentage of Utterance			
at Stage 1	14.07	11.03	0.020
at Stage 4	15.89	11.22	<0.001
at Stage 7	15.53	22.08	0.001

situations during both the administration of the cognitive tasks and the collection of the language sample. Whether or not the significant results described above can be attributed solely to the difference in administration procedure is unknown. For example, the results could be attributed to differences in the inmate samples assigned

to the two examiners. Differences in sample due to differences in subject characteristics might have occured in spite of the care taken to assign alternate subjects to different examiners, etc.

However, it was possible to test for certain inmate differences using information gathered from the inmate files. These pieces of information reveal that the subjects tested by the two examiners did not statistically significantly differ on either standardized measures of intellectual competence or on the single standardized personality test, the Minnesota Multiphasic Personality Inventory. Moreover, the two groups of subjects did not differ on such measures as violence of crime or offence against person or property, nor on such demographic variables as age, length of sentence or highest grade completed in school. From the results of the comparison of the samples tests by the the two examiners, on variables over which they had no control, it may tentatively be concluded that sample characteristics did not influence the examiner differences, and that the differences are due to the administration procedure. In the present report, the results of the two examiners are analyzed separately.

Univariate Analyses by Examiner:

In this section of the Appendix, the characteristics of each sub-sample (for each of the two examiners), for each measure is described. Inter-relationships among the measures are described in Chapter IV.

Cognitive variables:

Following Directions Task: The overall and part scores for this test are presented in Table A-4, for each examiner separately. The main points of interest in this

Table A-4: Following Directions Task (10 Items) Scores by Examiner

Score	Examiner 1	Examiner 2
Total	3.82	4.12
No. attempted	7.72	8.60
Prorated score	5.05	4.95
Part scores:		
items 2-4	1.90	1.84
items 5-7	0.53	0.83
items 8-10	0.44	0.46
Single items (% of sample responding correctly):		
item 7	9.6%	25.7%

table are two. First, although in general the two examiners were similar on each part score and the overall score for this measure, they differed significantly (chi-square=9.02, df=1, p=0.003) on the percentage of subjects who correctly reponded to item 7. This item, which

requests the subject to be able to reverse rows in a matrix of letters while retaining some other rows in correct sequence, constitutes perhaps the most difficult sequencing task in this measure. It is known that unintentional reversals are a common indicator of many learning disabilities.

The second point concerns the overall level of performance of the two sub-samples. Although it appears from the gradient in part-scores (listed in Table A-4) that the subjects do in fact find item, say, eight, more difficult than item four, the general level of performance is low. Ekstrom, French and Harman (1976) report that, when they administered this test to a group of 574 American naval recruits, the average total score was 5.2. This is significantly higher than the total scores obtained from the present sub-samples of 3.82 and 4.13. From this comparison, it may be concluded that the subjects as a group are functioning below the level of the average person. The prorated scores, which are approximately equal to those obtained by Ekstrom et al., may indicate that these subjects can perform this task if given sufficient time. Ekstron's scores, of course, were obtained in a highly speeded administration.

Ship Destination Test: The results for the part and

the total scores for this task are reported in Table A-5.

Table A-5: Ship Destination Test (48 items)
Scores by Examiner

Score	Examiner 1	Examiner 2
Total score	13.51	15.53
No. attempted	21.98	27.69
Prorated score	25.07	23.99
Part scores:		
items 1-12	7.02	7.80
items 13-24	4.09	4.65
items 25-36	1.90	2.69
items 37-48	0.50	0.39

In the case of this test, the difference between the two examiners is spread rather more evenly than was true with Following Directions. The difference is, however, most marked in the third section of the test (items 25 to 36). Once again, the scores obtained for both sub-samples are lower than would be expected in the general population.

Diagramming Relations Test: The part and total scores for this task are reported in Table A-6. Three main results will be discussed. First, again, although examiners are different, with examiner two's sub-sample achieving generally higher scores than that of examiner one, the results obtained from both sub-samples are much lower than than expected. For example, Ekstrom et al.

Table A-6: Diagramming Relations Test (10 Items)
Scores by Examiner

Score	Examiner 1	Examiner 2
Total score	2.63	3.83
No. attempted	7.05	9.89
Prorated score	2.91	3.87
No. correct by response type (out of 2):		
type A	0.70	0.99
type B	0.38	0.65
type C	0.38	0.60
type D	0.45	0.65
type E	0.70	0.96
No. guesses by response type (for 2 items):		
type A	1.68	2.50
type B	1.45	1.84
type C	1.08	1.69
type D	1.03	1.43
type E	1.81	2.40
Level of comprehension	2.06	2.73
Identification of enclosing set:		
no. times attempted	3.29	5.69
no. times identified	4.97	8.10

obtained a mean score of 6.05 from their sample of naval recruits, in a highly speeded test administration. In the case of the two sub-samples investigated in this study, it would seem that even allowing unlimited time would not raise the mean scores to the level obtained by the general population.

The second point is that the examiner differences are generally constant across all sub-areas of this task. That is, not only are the total scores and the number of items attempted different for the two examiners, but the part scores and the number of guesses made for each item type differ consistently between the two.

When Table A-6 is examined, it is apparent that three of the item types (B,C and D) are not only much more difficult for both sub-samples, but also stimulate fewer guesses than do item types A and E. What item types B, C and D have in common is that they all involve an intersection of a smaller set with either a second small set or the enclosing one. It is possible that these subjects, who tend to be low in selective attention skills, have simply not yet learned to pay attention to the critical variable of part versus whole.

Concrete/Abstract Tasks: The results of the analysis of the three concrete/abstract tasks are reported in Table A-7. As may be seen in the table, the trend in examiner differences are similar to those discussed above. That is, there is a tendency for the subjects tested by examiner 2 to score higher, although for most measures, the difference was not statistically significant. In addition, however, when the set of results is considered as a whole, it is evident that there is a tendency for the sample as a whole to interpret the material in a literal fashion. Thus, the largest proportion of each sample interpreted the first two proverbs in a literal fashion. This result did not hold for the third proverb ("The tongue is the enemy of the neck.") which was more

Table A-7: Concrete/Abstract Tasks - Scores by Examiner

Task and Scores	Examiner 2	Examiner 3
Picture:		
level of interpretation-1	1.35	1.23
level of interpretation-2	2.78	3.03
Fable:		
elements recalled (% of sample recalling correctly):		
king is sick	45.9%	54.1%
unable to cure	43.8%	56.3%
prescription	45.5%	54.5%
happy man with no shirt	38.3%	61.7%
added details (% of sample):		
none	65.0%	56.8%
relevant	22.3%	31.4%
extraneous	7.8%	5.1%
erroneous	4.9%	6.8%
sequence of events (% of sample):		
correct	40.2%	59.8%
Proverbs:		
interpretation-1 (% of sample):		
correct,abstract	13.6%	19.5%
literal only	53.4%	59.3%
wrong	13.6%	10.2%
interpretation-2 (% of sample):		
correct,abstract	12.6%	16.1%
literal only	32.0%	36.4%
wrong	24.3%	19.5%
interpretation-3 (% of sample):		
correct,abstract	35.0%	48.3%
literal only	5.8%	6.8%
wrong	22.3%	16.9%

difficult to interpret literally.

Further evidence of the overall tendency to literal interpretation is found in the "elements recalled" of the fable. The most abstract of the elements was also the least frequently recalled (for examiner 1's subjects).

The repetition (if necessary) of the fable which examiner 2 allowed perhaps resulted in the higher recall of this element for her subjects.

Language sample:

The overall results of the analysis of the sample of language, which used the pictures as stimuli, is given in Table A-8. Once again, it may be seen from the results in

Table A-8: Language Sample - Measures by Examiner

Measure and Score	Examiner 1	Examiner 2
Number of Words	225.3	292.2
Mean Sentence Length	7.14	8.86
Number of Sentences	30.46	34.03
Mean Sentences per Turn	2.05	2.62
Hesitations	43.4	55.0
Questions	8.50	8.58
Others	19.55	16.12
Length of longest Pause	6.44	7.25
Percentage of Utterances:		
at stage 1	14.07	11.03
at stage 2	4.99	2.95
at stage 3	16.73	14.84
at stage 4	15.89	11.22
at stage 5	25.25	20.41
at stage 6	7.98	9.46
at stage 7	15.53	22.08

the table that Examiner Two's subjects appeared to be slightly more competent in syntactic ability. For

example, they produced more words, and more of their utterances were classified in higher stages. Almost 60% of the utterances were placed at Stage 5 or higher, as compared to about 49% of the utterances of Examiner One's subjects. However, the two groups did not appear to differ on such variables as mean sentence length, mean number of sentences per turn, number of questions and the length of longest pause.

It should be noted once again that both groups of subjects appear to be less competent syntactically than would be expected (if the subjects were of normal ability). For instance, Crystal has stated that normal adult utterances may be scored at stages 5 or above about 70% of the time. This figure compare with less than 60% even for the group for whom many opportunites for modelling were present.

Inmate File Information:

The average values for the demographic variables which were collected are presented in Table A-9. From the table, it is evident that, despite the significant difference between examiners on the set of "marker" variables, the two groups of inmates cannot be distingushed on the basis of any of these five variables. Further investigation of the inmate file characteristics

Table A-9: Inmate File Information by Examiner

Measure	Examiner 1	Examiner 2
Age in Years:	27.6	28.1
Length of Sentence: (years)	8.66	9.37
Grade Completed:	7.96	7.87
General Type of Crime:		
violent	76.5%	81.2%
against the person	58.6%	63.9%

of persons such as those tested in the present study would, perhaps, reveal that they do not differ from the general prison population in terms of age, length of sentence and grade completed, but would perhaps have a higher rate of violent crimes, and of crimes against the person (as opposed to crimes against property). A pattern such as this would not be unexpected from the information available in the literature on impulsivity and crime.

Psychometric Information:

Cognitive characteristics: The available scores on each of several standardized measures of intelligence and a single achievement test are presented in Table A-10. The interpretation of the results is somewhat tentative, due to the rather small samples of subjects for whom

Table A-10: Cognitive Characteristics - Scores by Examiner by Test

Test and Score	Examiner 1	Examiner 2
Intelligence:		
Weschler Adult Intelligence Scale:		
verbal I.Q.	86.3	88.0
performance I.Q.	95.5	96.36
number of subjects	8	14
Raven's Progressive Matrices		
WAIS Equiv. I.Q.	91.7	95.6
number of subjects	9	7
Beta and revised Beta:		
Beta I.Q.	82.5	85.3
number of subjects	30	32
Achievement:		
S.C.A.T.:		
Verbal	36.2	47.3
Mathematics	35.8	32.0
Total	35.4	47.5
number of subjects	11	17

scores were available (compared to the size of the total sample), and the non-comparable nature of the several test scores. However, it would appear that the subjects score in the low normal range on measures of verbal intelligence, and very close to average on performance measures. Scores did not appear to differ for examiners, thereby supporting the conclusion that examiner differences in test scores were due to differences in administration procedures.

A final point which should be emphasized is that even these limited results support the conclusion that

standardized tests of ability should not be used as diagnostic measures of learning disability. In the present sample, the VIQ-PIQ differences could be indicative of any one of several problems, only one of which is related to learning disability.

Personality characteristics: The average values for the group of subjects (n's equal 45 and 56 respectively)

Table A-11: M.M.P.I. Scores by Examiner

Scale	Examiner 1	Examiner 2
Validity Scales:		
L	52.8	51.1
F	71.7	70.6
K	51.5	48.3
Clinical Scales:		
Hysteria	63.4	61.1
Depression	69.6	68.8
Hypochondryasis	64.5	60.2
Psychopathy	78.6	71.2
Masculine-Feminine	56.9	58.8
Paranoia	69.1	64.2
Psychasthenia	68.6	65.7
Schizophrenia	77.2	69.9
Mania	63.6	66.1
Social Introversion	59.7	57.9

for whom MMPI test scores were available is presented in Table A-11. As may be seen there, most of the scores fall within a range which is not clinically significant. One

of the validity scales (the F-scale) is sufficiently elevated that the validity of the set of responses as a whole must be considered suspect. The only clinical scale which may be considered clinically significant is the Psychopathy scale, which on the average is moderately elevated. Because of the behavioral similarities between the manifestations of the psychopathic personality and certain affective characteristics of the learning disabled adult, this result is not surprising. Further research should, however, include measures of personality, in order to further clarify this finding.

APPENDIX B:

MEASURES DERIVED FROM THE TASKS

Cognitive Tasks:

Following Directions Task:
- total number of items correct
- number of items attempted (out of 10)
- prorated total score (total/no. attempted * 10)
- number correct - items 2 through 4
- number correct - items 5 through 7
- number correct - items 8 through 10

Ship Destination Test:
(NOTE: items 1 through 9 were used as teaching items)
- total number of items correct (out of 48)
- number of items attempted (out of 48)
- prorated total score (total/no. attempted * 48)
- number correct - items 10 through 21
- number correct - items 22 through 33
- number correct - items 34 through 45
- number correct - items 45 through 57

Diagramming Relationships Test:
(NOTE: items 1 through 5 were used as teaching items)
- total number of items correct (out of 10)
- number of items attempted (out of 10)
- prorated total score (total/no. attempted * 10)
- number of guesses made: item type "A"
  item type "B"
  item type "C"
  item type "D"
  item type "E"
- no. of items correct (0,1,2): item type "A"
  item type "B"
  item type "C"
  item type "D"
  item type "E"
- no/yes response to questions:
  Did person know he was to match a diagram to a set of words?
  Could person see that there was some relationship among the words in an item?

Was the inclusive set identified correctly?
Could the verbal relationship be translated symbolically?
Could relationship between large and small sets be expressed?
sum of responses to the five questions
number of times ident. of inclusive set attempted
number of times ident. of inclusvie set correct

Concrete/Abstract Tasks:
Picture: Level of interpretation:
-don't know, no response
-literal interpretation
-partial
-correct literal
-abstract interpretation
-simple abstract
-complex abstract
-predictive statements
-critical statements

Fable: Level of Interpretation:
-don't know, no response
-incorrect literal
-correct literal
-incorrect abstract
-correct abstract

Fable: Elements Recalled (each no/yes):
-king is sick
-doctors could not cure him
-nature of the prescription
-happy man had no shirt

Fable: Other measures
-correct sequence of events
-added details:
-none
-irrelevant
-incorrect
-relevant

Proverbs: Level of Interpretation
-no response, don't know
-irrelevant, incorrect
-correct, literal only
-correct, abstract

Language Sample: The scoring followed the procedure outlined by Crystal et al. and is, therefore, not outlined here.

Inmate File Information:

Demographic Variables:

- -age of inmate
- -length of sentence
- -grade completed in school
- -nature of crime:
  - -violent
  - -nonviolent
- -nature of crime:
  - -against person
  - -against property

Psychometric Information:

- -type of intelligence test and scores
- -type of achievement test and scores
- -MMPI scale scores (T-values)